File Copy
Surname

J. Alt.
Kilsgaard
Gehan
Martin

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

MAY 23 1956

Mr. W. Leo Knell
270 North First Street E.
Cedar City, Utah

Re: Docket No. DMEA-4195 (Copper)
W. Leo Knell
Highland Claims
Iron County, Utah

Dear Mr. Knell:

Your application for aid for an exploration project and other reports available to us in Washington concerning your application have been reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgment, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Careful study of all our information, although noting a small amount of copper mineralization on your lease, indicates to us that the probability of disclosing significant ore reserves is not sufficiently promising to justify Government participation. We regret to advise you, under these circumstances, that your application for exploration assistance is denied.

We wish to thank you for your interest in the Defense Minerals Program and for bringing your property to our attention.

Sincerely yours,

C. O. Mittendorf

Administrator

JWAlt/er 5/23/56
Copy to: Docket
Admr R File
Op. Committee
Base Metals
Mr. Pennington, USBM
Mr. Kiilsgaard, USGS
Region III (2)
Chron.

R.C.G.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION 500
WASHINGTON 25, D. C.

May 23, 1956

Memorandum

To: The Administrator

From: Chief, Base Metals Division

Subject: Denial of Application, Docket No. DMEA-4195 (Copper), W. Leo Knell, Highland Claims, Iron County, Utah

The cited application dated February 15, 1956, was forwarded by the Executive Officer, DMEA Field Team, Region III, and was received by this office on February 27.

The Applicant proposed to explore the property by drilling two diamond drill holes to intersect the formation at depth at each of two locations where copper mineralization occurs at the contact. Aggregate footage for the four holes totals 800 feet. About 30 hours of bulldozer work would be required to make an access road to the locations and to prepare drill sites. The Applicant's estimated cost of the project was $5,800.00.

The property is developed by a 30 foot vertical shaft and a small amount of bulldozer trenching. The shaft excavation is quite old and probably represents work done by an earlier locator whereas the bulldozer trenching has been accomplished recently by the Applicant. There has been no production from this property.

Sufficient exploration has been conducted along the mineralized zone to demonstrate that little possibility exists that deposits of commercial significance will be found by the exploration proposed by the Applicant. No other target objectives are known in the area.

Examination of the property failed to reveal that the copper stained zones exposed on the surface are confined to structures which might be considered either laterally or with depth.

The Field Team states: "Copper staining occurs on the contact of the Tertiary limestone conglomerate and later Tertiary volcanics. The grade of the copper-mineral zones is far too low to be of economic interest and the attending features are such that there is no reason to believe that either grade or size will increase with depth. Further, there are no structural controls in evidence that might be considered projectable features. It is recommended therefore, that this loan application be denied."

We concur with the recommendations of the Field Team and the commodity members of the USGS and USBM that this application be denied.

W. R. Griswold

W. R. Griswold

File Copy
Surname
J. Ad

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

500

May 23, 1956

Memorandum

To: The Administrator

From: Chief, Base Metals Division

Subject: Denial of Application, Docket No. DMEA-4195 (Copper), W. Leo Knell, Highland Claims, Iron County, Utah

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W. R. Grimsold

W. R. Grimsold

JMAlt/er

Copy to: Docket
Base Metals
Chron.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

RECEIVED
MAY 23 1956

May 22, 1956

Memorandum

To: W. R. Griswold, Defense Minerals Exploration Administration

From: Commodity Industry Analyst, Branch of Base Metals

Subject: Review of Field Team Examination Report, Docket No. DMEA 4195 (copper), W. Leo Knell, Highland Claims, Iron County, Utah. $5,800.00

The Field Team examination report on this property by W. E. Young, Bureau of Mines, and R. W. Osterstock, Geological Survey, has been reviewed.

It was proposed to explore the mineralization at depth by 4 diamond drill holes totaling 800 feet at an estimated cost, including construction of roads and drill sites, of $5,800.00.

Examination of the property disclosed that the copper mineralization of the exposed ores is low and there are no indications that the grade or size will increase with depth.

I agree with the recommendation of the Field Team that the application to explore this property be denied.

J. W. Pennington

Copy to: Division of Minerals
Branch of Base Metals (2)
Thor Kiilsgaard, U.S.G.S.
R. W. Geehan
F i l e s

RECEIVED
MAY 23 1956

May 22, 1956

Memorandum

To: W. R. Griswold, Defense Minerals Exploration Administration

From: Commodity Industry Analyst, Branch of Base Metals

Subject: Review of Field Team Examination Report, Docket No. DMEA 4195 (copper), W. Leo Knell, Highland Claims, Iron County, Utah. $5,800.00

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I agree with the recommendation of the Field Team that the application to explore this property be denied.

J. W. Pennington

J. W. Pennington

Copy to: Division of Minerals
Branch of Base Metals (2)
Thor Kiilsgaard, U.S.G.S.
R. W. Gaston
F i l e s

IN REPLY REFER TO:

RECEIVED

MAY 16 1956

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

May 16, 1956

Re: DMEA 4195
W. Leo Knell
Highland Group
Iron County, Utah
$5,800 - Copper

Memorandum

To: W. R. Griswold
Defense Minerals Exploration Administration

From: N. E. Nelson
U. S. Geological Survey

Subject: Review of Field Team report.

The applicant requested assistance in exploring by diamond drilling showings of copper from which two high grade samples had been taken and assayed.

The examiners found only small scattered weakly mineralized 'contact' type copper deposits. Specimens of good material can be picked but for the most part the copper exists as stain. Considerable work has been done without improving the appearance of the showings and it is believed no change for the better should be expected should greater depth be obtained.

I concur with the recommendations of the examiners and the Field Team that the application should be denied.

N. E. Nelson

N. E. Nelson

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
MAY 16 1956

May 16, 1956

Re: DMEA 4195
W. Lee Knell
Highland Group
Iron County, Utah
$5,800 - Copper

Memorandum

To: W. H. Griswold
Defense Minerals Exploration Administration

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I concur with the recommendations of the examiners and the Field Team that the application should be denied.

N. E. Nelson

N. E. Nelson

NENelson:jeh
5/16/56
cc: Director's reading 4212
Branch reading 4212
DMEA (3)
Docket file
J.W.Pennington, 3623

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
MAY 10 1956

alh
Betty

May 7, 1956

224 New Customhouse
Denver 2, Colorado

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Field Team, Region III

Subject: Report of Examination, Docket DMEA 4195 (Copper) W. Leo Knell (Highland claims), Iron County, Utah

Enclosed are the original and three copies of an engineering and geologic reports of examination on the subject docket.

The field examiners concur that sufficient exploration has been done along the weakly mineralized zone to demonstrate that little possibility exists that a significant amount of copper would be found by further exploration. They recommend that the application be denied. We concur in this recommendation.

DMEA Field Team, Region III

By W. M. Traver
Executive Officer

Enclosures

Reviewed by
DMEA OPERATING COMMITTEE
5-14-56
(date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
1600 EAST FIRST SOUTH STREET
SALT LAKE CITY 1, UTAH

RECEIVED
MAY 10 1956

TRANSMITTED
MAY 7 - 1956

May 3, 1956

Memorandum

To: W. M. Traver, Executive Officer, DMEA Field Team, Region III

From: Stephen R. Wilson

Subject: Docket No. DMEA-4195 (Copper), W. Lee Knell (Highland claims), Iron County, Utah

Enclosed are the original and eight copies of an engineering report covering examination of the Highland claims for DMEA loan appraisal. The property was examined by W. E. Young with R. W. Osterstock of the Survey.

The applicant has requested a loan of $5,000 for access-road construction and diamond drilling. There has been no production from the property and there are no known ore reserves.

The rocks in the area of the Highland claims consist principally of limestone and conglomerate overlain by recent extrusive rocks. Copper mineralization is present along the irregular contact between the sediments and the flow rocks. The copper mineralization is generally weak, but widespread.

The examining engineer believes that sufficient exploration has been conducted along the mineralized zone to demonstrate that little possibility exists that deposits of commercial significance will be found by exploration proposed by the applicant. The examining engineer recommends that the request for Government participation in exploration be denied. I am in accord with this recommendation.

The brochure forwarded to this office was returned to E. N. Marshman April 30, 1956, attached to the geologic report prepared by R. W. Osterstock.

Stephen R. Wilson
Stephen R. Wilson

Enclosure

cc: J. F. Shaw
J. B. Clemmer

Reviewed by
DMEA OPERATING COMMITTEE
5-14-56
(date)

RECEIVED
MAY 10 1956

W. LEO KNELL
HIGHLAND CLAIMS
IRON COUNTY, UTAH
DMEA-4195
Copper

TRANSMITTED
MAY 7 - 1956

Engineering Report

By W. E. Young
Mining Engineer
Bureau of Mines

April 26, 1956

Reviewed by
DMEA OPERATING COMMITTEE
5-14-56
(date)

W. LEO KNELL
HIGHLAND CLAIMS
IRON COUNTY, UTAH

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Ownership, history and production	3
Description of the deposits	3
Proposed exploration	5
Project costs	5
Conclusions and recommendations	6

ILLUSTRATIONS

Fig. 1 Location map, W. Leo Knell, Highland claims, Iron County, Utah
Fig. 2 Claim map showing proposed diamond drill holes
Fig. 3 Sections through proposed diamond drill holes

SUMMARY

Copper mineralization occurs at the contact of the sedimentary Claron limestone and overlying extrusive rocks on the Highland group of claims, near Newcastle, Utah. Work done by the applicant and others consists of one 30-foot shaft at one location, and some pits and trenches at another location. A DMEA loan application requests $5,800 for access road building and diamond drilling.

The type of mineralization observed is similar to that at other locations in the surrounding area. It is usually confined to the contact or to small veinlets in the underlying limestone. Although widespread, there are no known occurrences in sufficient concentration to be of economic importance. It is recommended the application for loan be denied.

INTRODUCTION

The property of W. Leo Knell, Highland claims, docket No. DMEA-4135, was examined April 12, 1956, by a geologist of the Geological Survey and an engineer of the Bureau of Mines. The examination was made at the request of the Regional Field Team to determine the advisability of granting a Government-assistance loan. Mr. Knell, lessee of the property, accompanied the examiners over the claims.

The application, made in February 1956, requests a loan of $5,800 for access road building and diamond drilling.

LOCATION, TOPOGRAPHY AND PHYSICAL FEATURES

The claims the applicant proposes to explore are located in Sec. 29, T. 36 S., R. 15 W., S.L.B. and M. (fig. 1). Access by road is via State Highway 56 from Cedar City west to the town of Newcastle, a distance of 30 miles. The property is 2 miles south of Newcastle near the summit of low hills fronting the Escalante valley.

OWNERSHIP, HISTORY AND PRODUCTION

The claims are leased by the applicant from Jess Holt of Enterprise, Utah. They are held by right of location with notices of location in Book N, pages 473 and 474, in the office of the Iron County recorder at Parowan, Utah.

Completed exploratory work consists of one 30-foot shaft on a fault zone and some surface trenching at another location. One-half mile of access road has been constructed to the base of the range.

There has been no production from the property.

DESCRIPTION OF THE DEPOSITS

The rocks in the range south of Newcastle consist of sedimentary limestones and conglomerates overlain by extrusive rocks. Late Tertiary lavas and tuffs rest nearly horizontally on the uneven erosional surface of the early Tertiary Claron conglomerate. The exposed rocks in an area about 5 miles east indicate the section is as follows:

Formation	Age	Thickness
Trachytes, rhyolites, tuffs and agglomerates	Late Miocene	50'-600'
Claron limestone, conglomerate, and sandstone	Eocene	1,500'-2,000'
Pinto sandstone	Cretaceous	1,500'
Homestake limestone	Jurrasic	300'

The Claron formation is mainly limestone with thick layers and lenses of conglomerate. Occasional sandstone lenses are present. The conglomerate pebbles range in size from pea grain to rounded rocks the size of a fist. The pebbles are composed of quartzite, limestone, quartz, and chert. The limestone is soft and sandy, varying from white and gray to pink and brown. The flow rocks comprise a complex series of trachyte, andesite, and rhyolite.

The present erosion cycle has dissected the extrusives, exposing the base and contact with the underlying Claron formation in many places. Metamorphism by the lavas has apparently altered the limestones and developed chert, chalcedony, and jasper. Localized deposition of such minerals as calcite, barite, quartz, chalcocite, chalcopyrite, galena, and copper carbonates has resulted near the contact and in small veins in the limestone. Weak mineralization is widespread but at no place in the area is it known to be economic.

PROPOSED EXPLORATION

The applicant proposes to explore the property by drilling two diamond drill holes to intersect the formation at depth at each of two locations where copper mineralization occurs at the contact (figs. 2 and 3). Aggregate footage for the four holes totals 800 feet. About 30 hours of bulldozer work will be required to make an access road to the locations and to prepare drill sites.

The estimate of time required for completion of the work is given in the application as 2 months. It is believed that the work could be accomplished in 3 weeks. The applicant proposes to contract the diamond drilling and the bulldozer work. It is anticipated that it will be difficult to procure a contractor for such a small amount of footage, consequently the per-footage cost for the work will be high. Work could be started within 30 days after the date of the contract.

PROJECT COSTS

No contract bids for drilling were submitted with the application. The costs shown below are based on the applicant's estimate. These estimated costs are considered low because of the small footage involved.

Independent Contracts

Drilling		
4 holes, average depth 200 feet, core 800 feet at $5.625 per foot --------	$ 4,500.00	
Bulldozer work		
Roads, 20 hours at $10 per hour ----------	200.00	
Construction of drill sites, 10 hours at $10 per hour ----------	100.00	
Total, independent contracts ----------		$4,800.00

Labor and Supervision

Supervision includes direction of drilling, surveying, mapping, probing, and logging of holes and sampling.

1 geological consultant, part time	$ 200.00	
1 supervisor, 3 weeks	400.00	
Total, labor and supervision		$ 600.00

Material and Supplies

40 core boxes at $0.75	30.00

Miscellaneous

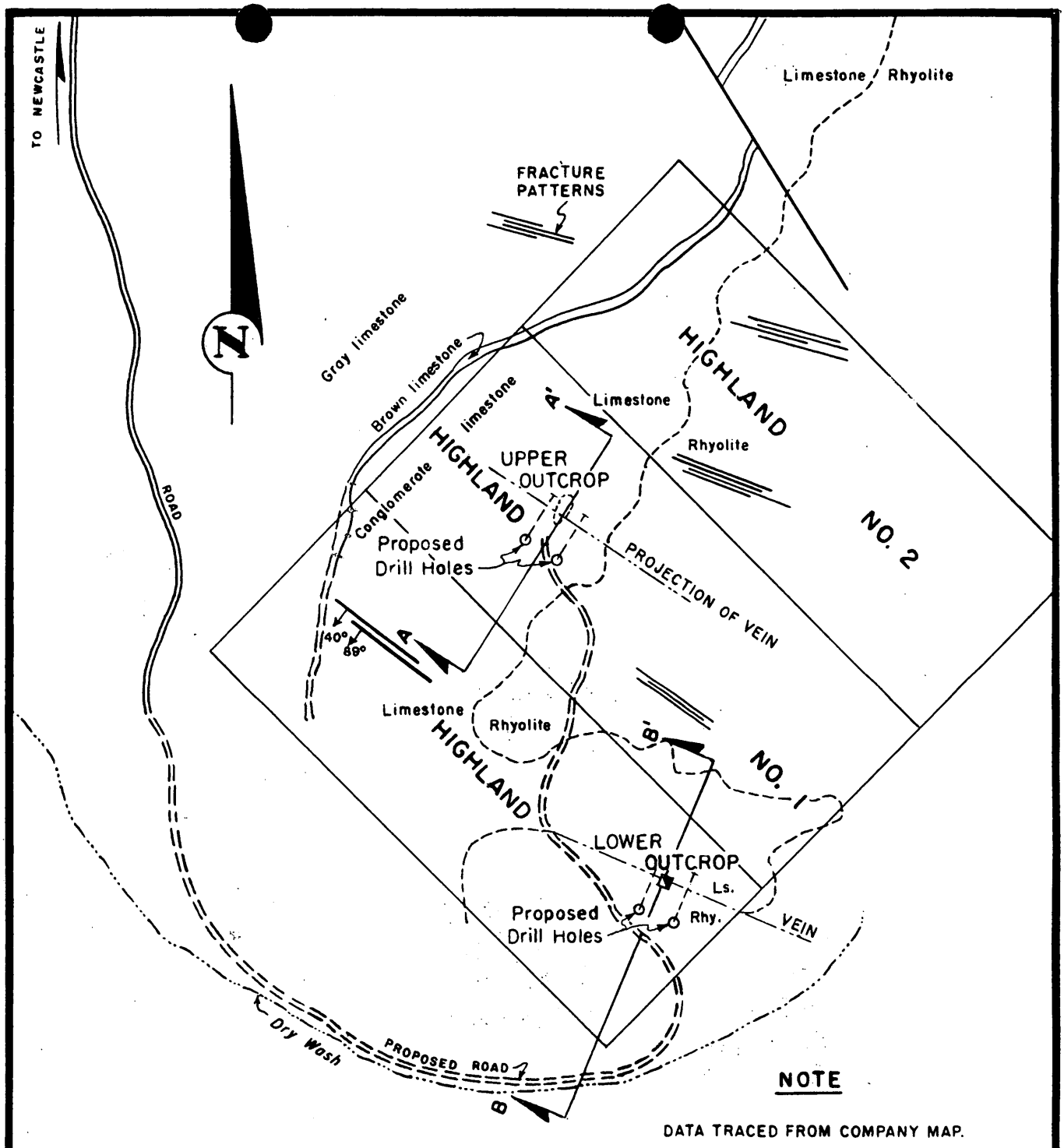
Sampling and analyses, 40 samples at $1.50	60.00
Total project costs	$5,490.00

The total cost of the work requested by the applicant is estimated at $5,490.

CONCLUSIONS AND RECOMMENDATIONS

Copper mineralization occurs at the contact between rhyolite flows and the sedimentary Claron formation on the Highland claims near Newcastle, Utah. This type mineralization is widespread in the area of the flows, but all known occurrences are too weak to be of economic importance. Work done by the applicant and others has failed to disclose mineralization at any place except adjacent to the contact. Sufficient work has been done to demonstrate that the sporadic mineralization along the contact is not of economic interest. No other target objectives are known in the area.

It is recommended the application for loan be denied.



NOTE

DATA TRACED FROM COMPANY MAP.

LEGEND

- FAULT
- MINERALIZED VEIN
- FRACTURE PATTERNS
- DRILL HOLE
- CONTACT

0 400 800

SCALE OF FEET

U. S. DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

Fig. 2 DMEA Docket No. 4195

Claim Map showing Proposed Drill Holes

W. LEO KNELL, HIGHLAND CLAIMS

IRON COUNTY, UTAH

ENGINEER: *W. E. YOUNG*	DATE: MAY 4, 1956
TRACED: MAY, 1956; A.P.T.S.	1900 - 140 - G
CHECKED:	

MINERAL DEPOSITS
DMEA
RECEIVED
MAY 2 1956

GEOLOGICAL SURVEY
DENVER, COLORADO
RECEIVED
MAY 10 1956

TRANSMITTED

MAY 7 - 1956

Room 208 - 222 So. West Temple
Salt Lake City 1, Utah
May 1, 1956

DMEA
Date Rec'd
MAY 3 1956
BUREAU OF MINES
Denver, Colorado

Memorandum

To: E. N. Harshman, DMEA Field Team, Region III

From: R. W. Osterstock

Subject: DMEA 4195 (copper), W. Lee Knell (Highland claims), Iron County, Utah.

Enclosed are 9 copies of a geologic report on the Highland claims in Iron County, Utah. The owner, W. Lee Knell, has applied for government aid on a diamond drilling program designed to test the downward extensions of the area of copper staining exposed on the surface. The proposed program is estimated to cost $5,800.00.

Field examination of the property revealed only very weak copper mineralization at the surface and no evidence to indicate that improvement of grade or size might be expected with depth. It is recommended therefore, that the subject application be denied.

R. W. Osterstock
R. W. Osterstock

cc: Wilson

Reviewed by
DMEA OPERATIONS OFFICER
5-14-56
(date)

W. LEO KNELL (Highland Claims)

IRON COUNTY, UTAH

RECEIVED
MAY 10 1956

TRANSMITTED
MAY 7 - 1956

DMEA DOCKET 4195

Initial Geologic Report

By R. W. Osterstock
U. S. Geological Survey

Reviewed by
DMEA OPERATING COMMITTEE
5-14-56
(date)

Contents

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History and production	3
Geology	3
Ore Deposits	5
Ore Reserves	6
Proposed Exploration	7
Conclusions and Recommendations	7

Illustrations

Fig. 1 — Index map of Utah . —

2 — Geologic section map and sections of Highland Claims.

RECEIVED
MAY 10 1956

Summary

The Highland claims located in Iron County, Utah and owned by W. Leo Knell, were examined by DMEA personnel during April, 1956 relative to an application for government assistance in the exploration for copper ores.

Copper staining occurs on the contact of Tertiary limestone conglomerate and later Tertiary volcanics. The grade of the exposed copper-mineral zones is far too low to be of economic interest and the attending features are such that there is no reason to believe that either grade or size will increase with depth. Further, there are no structural controls in evidence that might be considered projectable features. It is recommended therefore, that this loan application be denied.

INTRODUCTION

On February 15, 1955, W. Leo Knell of Newcastle, Utah made application for a DMEA loan (Docket 4195) to aid in exploration for copper ores on high Highland Claims in Iron County, Utah. At the request of the DMEA Region III Field Team an examination of the property was conducted April 12, 1956 by W. B. Young (USBM) and R. W. Osterstock (USGS). Mr. Knell accompanied the engineer during his inspection of the property but was not present during the geologist's inspection.

The estimated cost of the exploration program as proposed by the applicant is $5,800.00.

Location and accessibility

The Highland Claims are situate in the north half of Sec. 29, T. 36 S., R. 15 W., S. L. B. and M. in Iron County, Utah.

The claim area is on the rugged but relatively low northwesterly flank of the Pinto Range which overlooks the flat, alluvial filled Escalante Valley on the west.

The property may be reached by travelling westerly on paved Utah State Road No. 56 for 30 miles to its intersection with Utah State Road No. 16, thence turn left (south) for 2.4 miles on graded State Road No. 16 passing through the town of Newcastle, thence turn left (east) for 0.9 mile on graded dirt road which rapidly degenerates to a primitive bulldozer trail. This road ends near the mouth of a steep-walled easterly trending canyon which is only a short distance from the southwest corner of the first Highland claim.

History and production

The Highland claim group is composed of the Highland, Highland No. 1, and Highland No. 2 lode mining claims held by right of location by the applicant and recorded in Book N, pp. 473 and 474, in the Iron County Recorder's office, Cedar City, Utah.

The property is developed by a 30 foot vertical shaft and a small amount of bulldozer trenching. The shaft excavation is quite old and probably represents work done by an earlier locator whereas the bulldozer trenching has been accomplished recently by the applicant.

There is no recorded production from the Highland property, nor are there any other producing properties in the vicinity. An assay certificate dated March 16, 1955 which accompanied the application gives assays of two samples:

Sample No.	Copper %	Silver Oz.
1	31.31	---
2	25.04	3.5

No details as to type of sample or location are given but the high copper content makes apparent the fact that the samples were carefully selected.

GEOLOGY

The Highland calims lie on the low but rugged terrain comprising the northwest flank of the Pinto Range.

The only sedimentary rocks exposed in the claim area are the conglomerates and sandy limestones of the Eocene(?) Claron formation. This formation, now believed to be correlative with the Wasatch formation as described in reports dealing with the Colorado Plateau, was first

described by Harder and Leith (Iron Ores of the Iron Springs District, Southern Utah, U. S. Geol. Survey Bull. 338 pp. 41-44, 1908). H. J. Bissell (Guidebook to the Geology of Utah, No. 7, pp. 69-77, 1952) describes the Claron as being composed of white limestone, algal-ball limestone, pebble conglomerate and mottled limestone.

Actually, only very limited exposures of this formation are in evidence in the claim area because of the heavy slopewash. There are, however, three distinguishable units within the claim area, the stratigraphically lowest rock type is a gray friable sandy limestone. Overlying this unit is a relatively thin (20-40 feet) bed of brown sandy limestone with thin discontinuous shale partings. The highest unit noted is conglomeratic. Much of the material making up the conglomerate is in cobbles 4 to 5 inches in diameter; gray limestone, gray-brown sandy limestone and some quartzite are the preponderant rock types represented. The matrix is fine sandy limestone. The entire conglomeratic unit is iron stained to some extent and presents a reddish brown appearance on its weathered surfaces.

The only other rock type in the claim area is purplish weathering porphyritic andesite. The volcanics were apparently extruded upon a highly dissected surface of Claron limestone as the contact is extremely irregular. The andesite, grayish-green on fresh surfaces, contains phenocrysts of both plagioclase and orthoclase feldspar and biotite. The ground mass is generally felsitic in texture. Textural changes are extremely pronounced and thus permit description of this rock type only by generalities. The extrusion of these volcanics is tentatively assigned to Miocene time (Bissell, op. cit. p. 73).

The claim area is complexly faulted by diversely oriented faults and fractures. No major trend to the northwest could be established although such was suggested in Poehlman's geologic report which accompanied the application.

ORE DEPOSITS

Copper mineralization on the Highland claims is believed by the applicant to be confined to steeply dipping northwesterly striking veins along pre-existing fault zones.

Two areas, the upper and lower outcrops are considered by the applicant to offer the most promise. The "upper outcrop" has been trenched by a bulldozer to expose the copper-bearing zone. Malachite, possibly some antlerite or brochantite, and a few small relicts of chalcocite are the principal copper-bearing minerals. These minerals occur as fracture coatings and thin impregnations in slightly altered porphyritic andesite. A small amount of clear to smoky calcite accompanies the ore minerals. None of the above noted minerals were observed in place and it is therefore, impossible to postulate any trend to the mineralization.

The "lower outcrop" has been explored by a 30 foot vertical shaft. A zone, averaging perhaps 2 feet wide, shows copper staining in crushed material separating a nearly vertical wall of limestone conglomerate on the north from porphyritic andesite on the south. There is some doubt that this nearly vertical contact represents a persistent fault structure; rather it is suggested that the extrusive andesite has filled a steep walled canyon that existed in the limestone prior to the extrusion.

The uppermost part of the conglomerate-andesite contact bends sharply to the northeast with a fairly shallow dip and shows no trace of movement. Undoubtedly there has been some form of adjustment along the steeper part of the contact which might provide a zone of breakage such as that exposed in the shaft.

Malachite is the principal copper-bearing mineral although one specimen contained remnants of chalcopyrite as extremely fine irregular disseminated grains. There is little evidence of silicification or wallrock alteration. Although the conglomeratic limestone does contain a few small irregular chert stringers these do not appear to have any genetic relation to the ore minerals.

There is too little attendant alteration or silicification adjacent to the mineralized zone; and neither of the two "outcrops" shows sufficient intensity of mineralizing conditions to postulate improved grade or size with depth. The structural environs do not indicate either lateral or vertical persistence.

ORE RESERVES

There is no ore reserves of any classification on the Highland claims. A few hundred pounds of hand sorted material at both the upper and lower outcrops may contain up to 10 percent copper but considerable work must have been done to isolate this grade of copper ore. The two assays which accompanied the application showed 36.31 and 25.04 percent copper; these must have been small carefully chosen samples as no such grade was observed during the inspection. Although no samples were taken for assay by DMEA personnel, it is unlikely that bulk sampling of either outcrop would show more than 1 percent copper.

PROPOSED EXPLORATION

The applicant has proposed an exploration program costing $5,800.00 to be used for diamond drilling four incline holes to test the downward extensions of copper-bearing zones exposed at the surface. Two possibilities are offered by the applicant in support of his proposals: 1) "grade will increase with depth where the mineral is nearer its source", and 2) "Ore grade material will be found where the vein has penetrated limestone to form replacement deposits."

Examination of the property failed to reveal that the copper stained zones exposed on the surface are confined to structures which might be considered persistent either laterally or with depth.

CONCLUSIONS AND RECOMMENDATIONS

The Highland claims in Iron County, Utah, owned by W. Leo Knell, are in an area of dissected Tertiary limestones over which andisitic volcanics have been extruded. Copper staining along a part of the limestone-andesite contact and in a broken zone in andesite does not appear to be sufficiently confined to any persistent structural elements to warrant its projection in any direction. The grade of the copper-bearing material exposed at the surface is far too low to be of economic interest and evidence in the form of weak alteration and very slight silicification suggests that original mineralizing intensity was too weak to predicate significantly improved grade with additional depth.

It is recommended that this application for government assistance be denied on the grounds that the property has virtually no chance of containing sufficient copper ores to materially add to the national reserves.

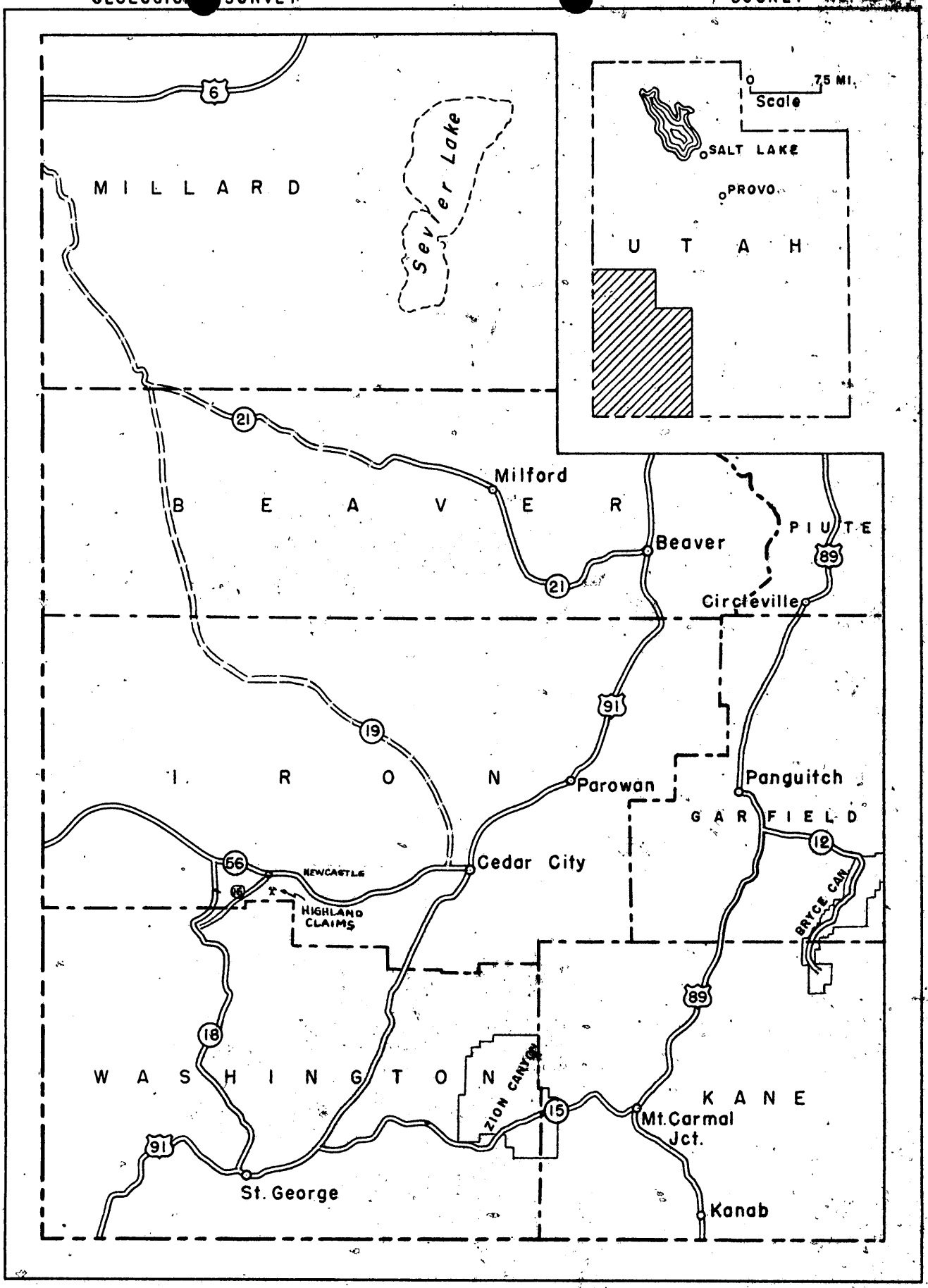

FIG. 1 INDEX MAP OF UTAH

0 5 10 15 20 MILES
Scale

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
MAY 10 1956

May 7, 1956

224 New Customhouse
Denver 2, Colorado

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Field Team, Region III

Subject: Report of Examination, Docket DMEA 4195 (Copper) W. Leo Knell (Highland claims), Iron County, Utah

Enclosed are the original and three copies of an engineering and geologic reports of examination on the subject docket.

The field examiners concur that sufficient exploration has been done along the weakly mineralized zone to demonstrate that little possibility exists that a significant amount of copper would be found by further exploration. They recommend that the application be denied. We concur in this recommendation.

DMEA Field Team, Region III

By W. M. Traver
Executive Officer

Enclosures

Reviewed by
DMEA OPERATING COMMITTEE

(date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
1600 EAST FIRST SOUTH STREET
SALT LAKE CITY 1, UTAH

RECEIVED
MAY 10 1956
DMEA
Date Rec'd
MAY 7 1956
BUREAU OF MINES
Denver, Colorado

May 3, 1956

TRANSMITTED
MAY 7 - 1956

Memorandum

To: W. M. Traver, Executive Officer, DMEA Field Team, Region III

From: Stephen R. Wilson

Subject: Docket No. DMEA-4195 (Copper), W. Lee Knell (Highland claims), Iron County, Utah

Enclosed are the original and eight copies of an engineering report covering examination of the Highland claims for DMEA loan appraisal. The property was examined by W. E. Young with R. W. Osterstock of the Survey.

The applicant has requested a loan of $5,000 for access-road construction and diamond drilling. There has been no production from the property and there are no known ore reserves.

The rocks in the area of the Highland claims consist principally of limestone and conglomerate overlain by recent extrusive rocks. Copper mineralization is present along the irregular contact between the sediments and the flow rocks. The copper mineralization is generally weak, but widespread.

The examining engineer believes that sufficient exploration has been conducted along the mineralized zone to demonstrate that little possibility exists that deposits of commercial significance will be found by exploration proposed by the applicant. The examining engineer recommends that the request for Government participation in exploration be denied. I am in accord with this recommendation.

The brochure forwarded to this office was returned to E. N. Harshman April 30, 1956, attached to the geologic report prepared by R. W. Osterstock.

Stephen R. Wilson
Stephen R. Wilson

Enclosure

cc: J. F. Shaw
J. B. Clemmer

APPROVED BY
DMEA OPERATING COMMITTEE

(date)

RECEIVED
MAY 10 1956

TRANSMITTED
MAY 7 - 1956

W. LEO KNELL
HIGHLAND CLAIMS
IRON COUNTY, UTAH
BMEA-4195
Copper

Engineering Report

By W. R. Young
Mining Engineer
Bureau of Mines

April 26, 1956

[illegible]
[illegible] OF [illegible] MINES

(date)

RECEIVED
MAY 10 1956

W. LEO KNELL
HIGHLAND CLAIMS
IRON COUNTY, UTAH

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Project costs	5
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ILLUSTRATIONS

Fig. 1 Location map, W. Leo Knell, Highland claims, Iron County, Utah
Fig. 2 Claim map showing proposed diamond drill holes
Fig. 3 Sections through proposed diamond drill holes

SUMMARY

Copper mineralization occurs at the contact of the sedimentary Claron limestone and overlying extrusive rocks on the Highland group of claims, near Newcastle, Utah. Work done by the applicant and others consists of one 30-foot shaft at one location, and some pits and trenches at another location. A DMEA loan application requests $5,800 for access road building and diamond drilling.

The type of mineralization observed is similar to that at other locations in the surrounding area. It is usually confined to the contact or to small veinlets in the underlying limestone. Although widespread, there are no known occurrences in sufficient concentration to be of economic importance. It is recommended the application for loan be denied.

INTRODUCTION

The property of W. Lee Knell, Highland claims, docket No. DMEA-4135, was examined April 12, 1956, by a geologist of the Geological Survey and an engineer of the Bureau of Mines. The examination was made at the request of the Regional Field Team to determine the advisability of granting a Government-assistance loan. Mr. Knell, lessee of the property, accompanied the examiners over the claims.

The application, made in February 1956, requests a loan of $5,800 for access road building and diamond drilling.

LOCATION, TOPOGRAPHY AND PHYSICAL FEATURES

The claims the applicant proposes to explore are located in Sec. 29, T. 36 S., R. 15 W., S.L.B. and M. (fig. 1). Access by road is via State Highway 56 from Cedar City west to the town of Newcastle, a distance of 30 miles. The property is 2 miles south of Newcastle near the summit of low hills fronting the Escalante valley.

OWNERSHIP, HISTORY AND PROMOTION

The claims are leased by the applicant from Jess Holt of Enterprise, Utah. They are held by right of location with notices of location in Book N, pages 473 and 474, in the office of the Iron County recorder at Parowan, Utah.

Completed exploratory work consists of one 30-foot shaft on a fault zone and some surface trenching at another location. One-half mile of access road has been constructed to the base of the range.

There has been no production from the property.

DESCRIPTION OF THE DEPOSITS

The rocks in the range south of Newcastle consist of sedimentary limestones and conglomerates overlain by extrusive rocks. Late Tertiary lavas and tuffs rest nearly horizontally on the uneven erosional surface of the early Tertiary Claron conglomerate. The exposed rocks in an area about 5 miles east indicate the section is as follows:

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MAY 10 1956

Formation	Age	Thickness
Trachytes, rhyolites, tuffs and agglomerates	Late Miocene	50'-600'
Claron limestone, conglomerate, and sandstone	Eocene	1,500'-2,000'
Pinto sandstone	Cretaceous	1,500'
Homestake limestone	Jurrasic	300'

The Claron formation is mainly limestone with thick layers and lenses of conglomerate. Occasional sandstone lenses are present. The conglomerate pebbles range in size from pea grain to rounded rocks the size of a fist. The pebbles are composed of quartzite, limestone, quartz, and chert. The limestone is soft and sandy, varying from white and gray to pink and brown. The flow rocks comprise a complex series of trachyte, andesite, and rhyolite.

The present erosion cycle has dissected the extrusives, exposing the base and contact with the underlying Claron formation in many places. Metamorphism by the lavas has apparently altered the limestones and developed chert, chalcedony, and jasper. Localized deposition of such minerals as calcite, barite, quartz, chalcocite, chalcopyrite, galena, and copper carbonates has resulted near the contact and in small veins in the limestone. Weak mineralization is widespread but at no place in the area is it known to be economic.

PROPOSED EXPLORATION

The applicant proposes to explore the property by drilling two diamond drill holes to intersect the formation at depth at each of two locations where copper mineralization occurs at the contact (figs. 2 and 3). Aggregate footage for the four holes totals 800 feet. About 30 hours of bulldozer work will be required to make an access road to the locations and to prepare drill sites.

The estimate of time required for completion of the work is given in the application as 2 months. It is believed that the work could be accomplished in 3 weeks. The applicant proposes to contract the diamond drilling and the bulldozer work. It is anticipated that it will be difficult to procure a contractor for such a small amount of footage, consequently the per-footage cost for the work will be high. Work could be started within 30 days after the date of the contract.

PROJECT COSTS

No contract bids for drilling were submitted with the application. The costs shown below are based on the applicant's estimate. These estimated costs are considered low because of the small footage involved.

Independent Contracts

Drilling

4 holes, average depth 200 feet, core 800 feet at $5.625 per foot	$ 4,500.00

Bulldozer work

Roads, 20 hours at $10 per hour	200.00	
Construction of drill sites, 10 hours at $10 per hour	100.00	
Total, independent contracts		$4,800.00

Labor and Supervision

Supervision includes direction of drilling, surveying, mapping, probing, and logging of holes and sampling.

1 geological consultant, part time	$ 200.00	
1 supervisor, 3 weeks	400.00	
Total, labor and supervision		$ 600.00

Material and Supplies

40 core boxes at $0.75	30.00

Miscellaneous

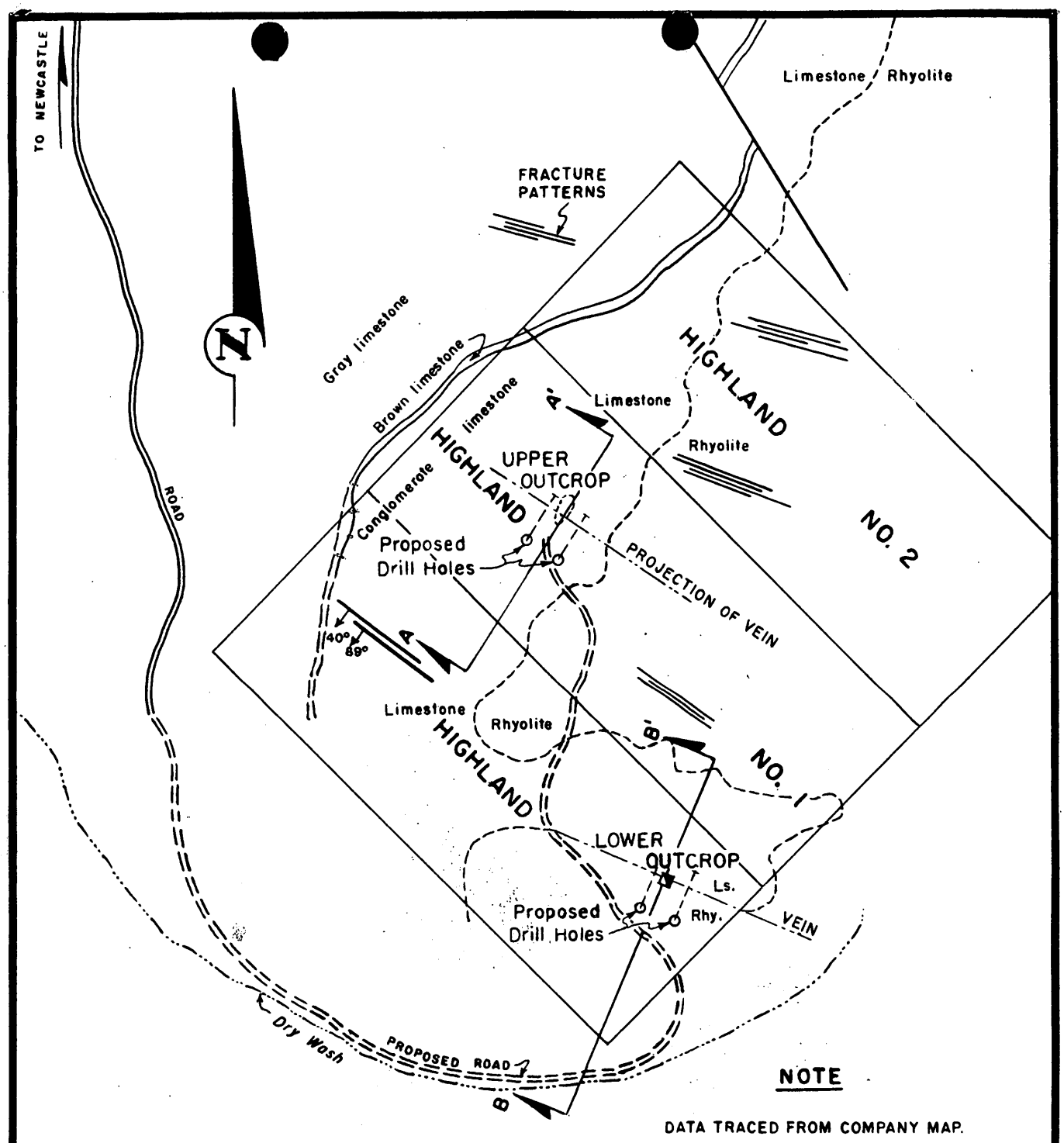
Sampling and analyses, 40 samples at $1.50	60.00
Total project costs	$5,490.00

The total cost of the work requested by the applicant is estimated at $5,490.

CONCLUSIONS AND RECOMMENDATIONS

Copper mineralization occurs at the contact between rhyolite flows and the sedimentary Claron formation on the Highland claims near Newcastle, Utah. This type mineralization is widespread in the area of the flows, but all known occurrences are too weak to be of economic importance. Work done by the applicant and others has failed to disclose mineralization at any place except adjacent to the contact. Sufficient work has been done to demonstrate that the sporadic mineralization along the contact is not of economic interest. No other target objectives are known in the area.

It is recommended the application for loan be denied.



NOTE

DATA TRACED FROM COMPANY MAP.

LEGEND

- FAULT
- MINERALIZED VEIN
- FRACTURE PATTERNS
- DRILL HOLE
- CONTACT

0 400 800

SCALE OF FEET

U. S. DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

Fig. 2 DMEA Docket No. 4195

Claim Map showing Proposed Drill Holes

W. LEO KNELL, HIGHLAND CLAIMS

IRON COUNTY, UTAH

ENGINEER: *W. E. YOUNG*	DATE: MAY 4, 1956
TRACED: MAY, 1956; A.P.T.S.	1900 - 140 - G
CHECKED:	

W. LEO KNELL (Highland Claims)

IRON COUNTY, UTAH

RECEIVED
MAY 1 0 1956

TRANSMITTED

MAY 7 - 1956

DMEA DOCKET 4195

Initial Geologic Report

By R. W. Gutenstock
U. S. Geological Survey

Reviewed by
DMEA OPERATING COMMITTEE

_____
(date)

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Illustrations

Fig. 1 — Index map of Utah .

2 — Geologic section map and sections of Highland Claims.

Summary

The Highland claims located in Iron County, Utah and owned by W. Leo Knell, were examined by DMEA personnel during April, 1956 relative to an application for government assistance in the exploration for copper ores.

Copper staining occurs on the contact of Tertiary limestone conglomerate and later Tertiary volcanics. The grade of the exposed copper-mineral zones is far too low to be of economic interest and the attending features are such that there is no reason to believe that either grade or size will increase with depth. Further, there are no structural controls in evidence that might be considered projectable features. It is recommended therefore, that this loan application be denied.

INTRODUCTION

On February 15, 1955, W. Lee Knell of Newcastle, Utah made application for a DMEA loan (Docket 4195) to aid in exploration for copper ores on high Highland Claims in Iron County, Utah. At the request of the DMEA Region III Field Team an examination of the property was conducted April 12, 1956 by W. B. Young (USBM) and R. W. Caterstock (USGS). Mr. Knell accompanied the engineer during his inspection of the property but was not present during the geologist's inspection.

The estimated cost of the exploration program as proposed by the applicant is $5,800.00.

Location and accessibility

The Highland Claims are situate in the north half of Sec. 29, T. 36 S., R. 15 W., S. L. B. and M. in Iron County, Utah.

The claim area is on the rugged but relatively low northwesterly flank of the Pinto Range which overlooks the flat, alluvial filled Escalante Valley on the west.

The property may be reached by travelling westerly on paved Utah State Road No. 56 for 30 miles to its intersection with Utah State Road No. 16, thence turn left (south) for 2.4 miles on graded State Road No. 16 passing through the town of Newcastle, thence turn left (east) for 0.9 mile on graded dirt road which rapidly degenerates to a primitive bulldozer trail. This road ends near the mouth of a steep-walled easterly trending canyon which is only a short distance from the southwest corner of the first Highland claim.

History and production

The Highland claim group is composed of the Highland, Highland No. 1, and Highland No. 2 lode mining claims held by right of location by the applicant and recorded in Book N, pp. 473 and 474, in the Iron County Recorder's office, Cedar City, Utah.

The property is developed by a 30 foot vertical shaft and a small amount of bulldozer trenching. The shaft excavation is quite old and probably represents work done by an earlier locator whereas the bulldozer trenching has been accomplished recently by the applicant.

There is no recorded production from the Highland property, nor are there any other producing properties in the vicinity. An assay certificate dated March 16, 1955 which accompanied the application gives assays of two samples:

Sample No.	Copper %	Silver Oz.
1	31.31	—
2	25.04	3.5

No details as to type of sample or location are given but the high copper content makes apparent the fact that the samples were carefully selected.

GEOLOGY

The Highland claims lie on the low but rugged terrain comprising the northwest flank of the Pinto Range.

The only sedimentary rocks exposed in the claim area are the conglomerates and sandy limestones of the Eocene(?) Claron formation. This formation, now believed to be correlative with the Wasatch formation as described in reports dealing with the Colorado Plateau, was first

described by Harder and Leith (Iron Ores of the Iron Springs District, Southern Utah, U. S. Geol. Survey Bull. 336 pp. 41-44, 1908). H. J. Bissell (Guidebook to the Geology of Utah, No. 7, pp. 69-77, 1952) describes the Claron as being composed of white limestone, algal-ball limestone, pebble conglomerate and mottled limestone.

Actually, only very limited exposures of this formation are in evidence in the claim area because of the heavy slopewash. There are, however, three distinguishable units within the claim area, the stratigraphically lowest rock type is a gray friable sandy limestone. Overlying this unit is a relatively thin (20-40 feet) bed of brown sandy limestone with thin discontinuous shale partings. The highest unit noted is conglomeratic. Much of the material making up the conglomerate is in cobbles 4 to 5 inches in diameter; gray limestone, gray-brown sandy limestone and some quartzite are the preponderant rock types represented. The matrix is fine sandy limestone. The entire conglomeratic unit is iron stained to some extent and presents a reddish brown appearance on its weathered surfaces.

The only other rock type in the claim area is purplish weathering porphyritic andesite. The volcanics were apparently extruded upon a highly dissected surface of Claron limestone as the contact is extremely irregular. The andesite, grayish-green on fresh surfaces, contains phenocrysts of both plagioclase and orthoclase feldspar and biotite. The ground mass is generally felsitic in texture. Textural changes are extremely pronounced and thus permit description of this rock type only by generalities. The extrusion of these volcanics is tentatively assigned to Miocene time (Bissell, op. cit. p. 73).

The claim area is complexly faulted by diversely oriented faults and fractures. No major trend to the northeast could be established although such was suggested in Peckham's geologic report which accompanied the application.

ORE DEPOSITS

Copper mineralization on the Highland claims is believed by the applicant to be confined to steeply dipping northwesterly striking veins along pre-existing fault zones.

Two areas, the upper and lower outcrops are considered by the applicant to offer the most promise. The "upper outcrop" has been trenched by a bulldozer to expose the copper-bearing zone. Malachite, possibly some antlerite or brochantite, and a few small relicts of chalcocite are the principal copper-bearing minerals. These minerals occur as fracture coatings and thin impregnations in slightly altered porphyritic andesite. A small amount of clear to smoky calcite accompanies the ore minerals. None of the above noted minerals were observed in place and it is therefore, impossible to postulate any trend to the mineralization.

The "lower outcrop" has been explored by a 30 feet vertical shaft. A zone, averaging perhaps 2 feet wide, shows copper staining in crushed material separating a nearly vertical wall of limestone conglomerate on the north from porphyritic andesite on the south. There is some doubt that this nearly vertical contact represents a persistent fault structure; rather it is suggested that the extrusive andesite has filled a steep walled canyon that existed in the limestone prior to the extrusion.

The uppermost part of the conglomerate-andesite contact bends sharply to the northeast with a fairly shallow dip and shows no trace of movement. Undoubtedly there has been some form of adjustment along the steeper part of the contact which might provide a zone of breakage such as that exposed in the shaft.

Malachite is the principal copper-bearing mineral although one specimen contained remnants of chalcopyrite as extremely fine irregular disseminated grains. There is little evidence of silicification or wallrock alteration. Although the conglomeratic limestone does contain a few small irregular chert stringers these do not appear to have any genetic relation to the ore minerals.

There is too little attendant alteration or silicification adjacent to the mineralized zone; and neither of the two "outcrops" shows sufficient intensity of mineralizing conditions to postulate improved grade or size with depth. The structural environs do not indicate either lateral or vertical persistence.

ORE RESERVES

There is no ore reserves of any classification on the Highland claims. A few hundred pounds of hand sorted material at both the upper and lower outcrops may contain up to 10 percent copper but considerable work must have been done to isolate this grade of copper ore. The two assays which accompanied the application showed 36.31 and 25.04 percent copper; these must have been small carefully chosen samples as no such grade was observed during the inspection. Although no samples were taken for assay by DMEA personnel, it is unlikely that bulk sampling of either outcrop would show more than 1 percent copper.

PROPOSED EXPLORATION

The applicant has proposed an exploration program costing $5,000.00 to be used for diamond drilling four incline holes to test the downward extensions of copper-bearing zones exposed at the surface. Two possibilities are offered by the applicant in support of his proposals: 1) "grade will increase with depth where the mineral is nearer its source", and 2) "Ore grade material will be found where the vein has penetrated limestone to form replacement deposits."

Examination of the property failed to reveal that the copper stained zones exposed on the surface are confined to structures which might be considered persistent either laterally or with depth.

CONCLUSIONS AND RECOMMENDATIONS

The Highland claims in Iron County, Utah, owned by W. Lee Shell, are in an area of dissected Tertiary limestones over which andisitic volcanics have been extruded. Copper staining along a part of the limestone-andesite contact and in a broken zone in andesite does not appear to be sufficiently confined to any persistent structural elements to warrant its projection in any direction. The grade of the copper-bearing material exposed at the surface is far too low to be of economic interest and evidence in the form of weak alteration and very slight silicification suggests that original mineralizing intensity was too weak to predicate significantly improved grade with additional depth.

It is recommended that this application for government assistance be denied on the grounds that the property has virtually no chance of containing sufficient copper ores to materially add to the national reserves.

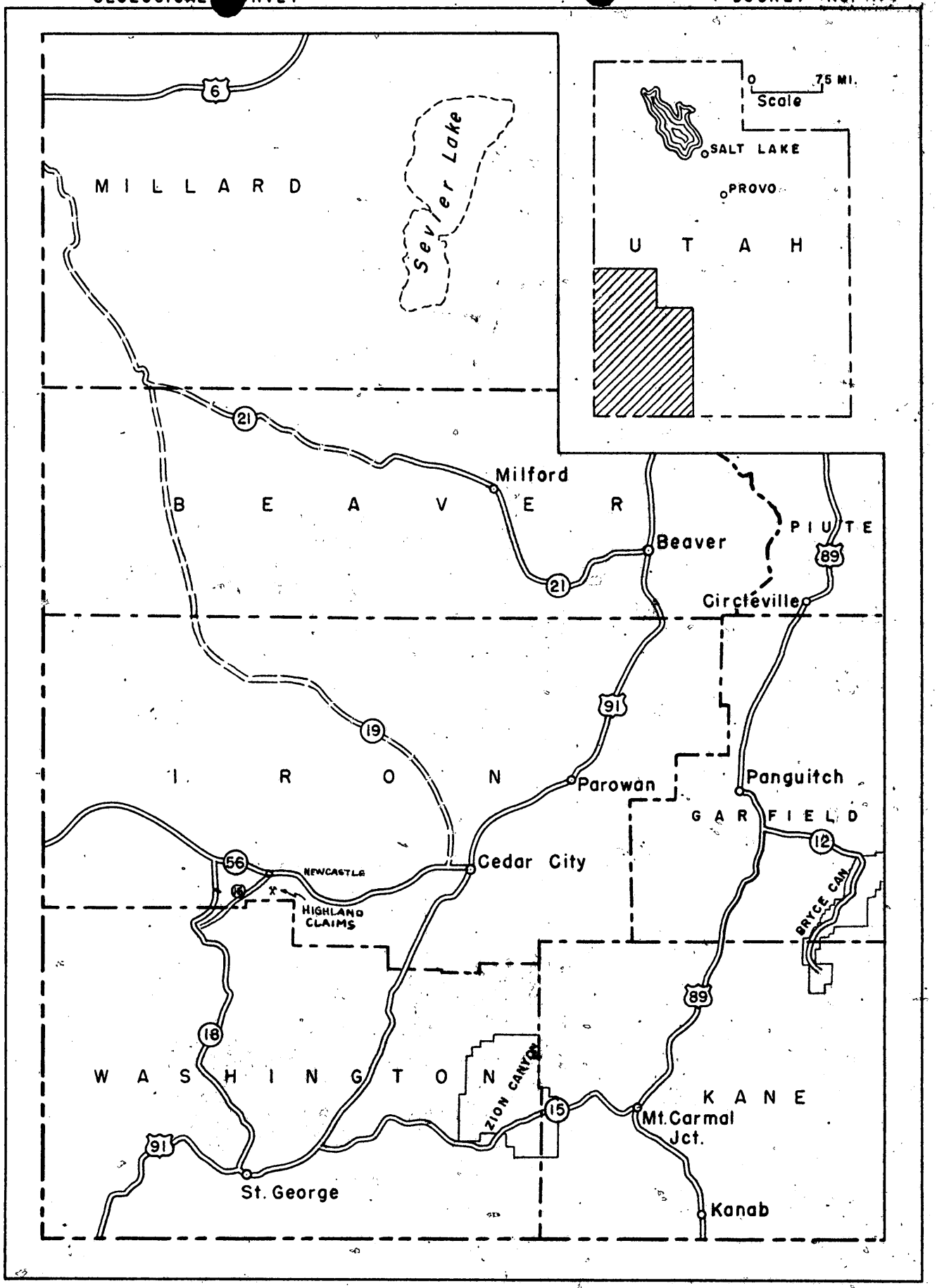

FIG. 1 INDEX MAP OF UTAH

0 5 10 15 20 MILES
Scale

MEA
Date Rec'd.

MAR 21 1956

BUREAU OF MINES
Denver, Colorado

March 21, 1956

Docket

Memorandum

To: S. R. Wilson

From: Superintendent, Denver Experiment Station, Reg. III

Subject: Docket DMEA 4195 (Copper), W. Leo Knell, Highland claims, Iron County, Utah

Enclosed please find the subject application in the amount of $5,800.00.

A field examination and suitable report are required. The completed report should be forwarded directly to the Executive Officer with a copy of the memorandum of transmittal to this office.

John F. Shaw

Enclosure

cc: W. M. Traver (3)
E. N. Marshman
R. W. Octerstock
Ch. Op. Com (2)

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
MAR 21 1956

March 16, 1956

224 New Customhouse
Denver 2, Colorado

Memorandum

To: J. F. Shaw (2) (With brochure and Geological Report by E. J. Poehlmann)
R. W. Gaterstock (With Geological Report by Poehlmann)

From: Field Team, Region III

Subject: Docket DMEA 4195 (Copper), W. Leo Knell, Highland claims, Iron County, Utah

Enclosed is the subject application in the amount of $5,800.00. A field examination and suitable report are requested. Enclosed for your further information is a copy of a letter from the Chairman of the Operating Committee dated March 14, 1956 and attached memoranda of review of the application by J. W. Pennington and H. E. Nelson.

DMEA Field Team, Region III

W. M. TRAVER

By W. M. Traver
Executive Officer

Enclosures

HMC:ab

cc: Chair. Op. Comm. (2)
Harshman
Docket 4195
Chron.

File Copy
Surname
J. Alb
Arizowell
Selfridge
Yeferman

500

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

Mr. W. M. Traver
Executive Officer
DMEA Field Team, Region III
224 New Customhouse Building
Denver 2, Colorado

MAR 14 1956

Re: Docket No. DMEA-4195 (Copper)
W. Leo Knell
Highland Claims
Iron County, Utah

Dear Mr. Traver:

The cited application for exploration assistance is being referred to your office for consideration, a field examination of the property if warranted, and recommendation.

In the event that you should consider this application favorably, the Applicant should be requested to obtain a Consent to Lien from the owners of this property.

Enclosed are two copies of the Geological Report, Highland Claims Group, Newcastle, Iron County, Utah, by Edwin J. Poehlmann. This report accompanied the application.

Copies of memoranda dated March 2 and 5, 1956, by N. E. Nelson, Geological Survey, and J. W. Pennington, Bureau of Mines, respectively, relating to the project, are enclosed for your information.

Sincerely yours,

George C. Selfridge
Chairman, Operating Committee (JB)

APPROVED:

/s/ Robert W. Geehan (JB)
Member, Bureau of Mines

Thor H. Kiilsgaard (JB)
Member, Geological Survey

JLlt/bjl (3/13/56)

Copy to: Docket
Admr. R. File
Op. Committee
Base Metals
Mr. Pennington
Mr. Kiilsgaard
Chfcn.

RCS.

File Copy
Surname

J. Reed
Hurwitz
Gechan
Kilgaard
Selfridge
Yeffersen

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

MAR 14 1956

Mr. W. Leo Knell
270 N. 1st E.
Cedar City, Utah

Re: Docket No. DMEA-4195 (Copper)
W. Leo Knell
Highland Claims
Iron County, Utah

Dear Mr. Knell:

Your application for Government assistance to explore the cited property has been reviewed by the Base Metals Division of the Defense Minerals Exploration Administration and has been referred to:

Mr. W. M. Traver, Executive Officer
DMEA Field Team, Region III
224 New Customhouse Building
Denver 2, Colorado

If the Field Team requires additional information concerning your application, they will contact you at an early date.

Sincerely yours,

C. O. Mittendorf

Administrator

JWAlt/bjl (3/13/56)

Copy to: Docket
Admr. R. File
Op. Committee
Base Metals
Mr. Pennington
Mr. Kiilsgaard
Region III

R.C.S.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

RECEIVED
MAR - 6 1956

March 5, 1956

Memorandum

To: W. R. Griswold, Defense Minerals Exploration Administration

From: J. W. Pennington, Branch of Base Metals

Subject: Review of application Docket No. DMEA 4195 (copper), W. Leo Knell, Highland Claims, Iron County, Utah, $5,800

It is proposed to partially explore this property by four diamond drill holes, two in each outcrop, aggregating about 700 feet at an estimated cost of $5,800. Included in this cost are the construction of access roads and drill sites. However, costs of sample analyses have not been included.

Analyses of two samples are submitted, yet the location of the samples is not given. The dips of the veins apparently are indefinite and it is possible the proposed drilling would fail to intersect the veins. Estimated costs of drilling such a small footage seems low.

Referral of the application to the Field Team is recommended for an examination and collection of necessary data.

J. W. Pennington

Copy to: Division of Minerals
Branch of Base Metals (2)
Thor Kiilsgaard, U.S.G.S.
R. W. Geehan
F i l e s

RECEIVED
MAR - 6 1956

March 5, 1956

Memorandum

To: W. R. Griswold, Defense Minerals Exploration Administration

From: J. W. Pennington, Branch of Base Metals

Subject: Review of application Docket No. DMEA 4195 (copper), W. Lee Knell, Highland Claims, Iron County, Utah, $5,800

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Referral of the application to the Field Team is recommended for an examination and collection of necessary data.

J. W. Pennington

J. W. Pennington

Copy to: Division of Minerals
Branch of Base Metals (2)
Thor Kiilsgaard, U.S.G.S.
R. W. Gochan
Files

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
MAR - 5 1956

March 2, 1956

Re: DMEA 4195
W. Leo Knell
Highland Group
Iron County, Utah
$5,800.00 - Copper

Memorandum

To: W. R. Griswold, Defense Minerals Exploration Administration

From: N. E. Nelson, U. S. Geological Survey

Subject: Review of application.

The applicant requests assistance in exploring by core drilling two vertical veins, one in limestone the other in the contact of limestone and rhyolite, from which specimens of high-grade copper ore have been taken.

The work proposed consists of:--

Drilling 700-800 feet at $5.00/ft.	$4,000.00
Bulldozing access roads and drill sites	300.00
Supervision and consultants	600.00
Water for drilling	500.00
Contingencies	400.00
Total	$5,800.00

A geologic report lends no support to the application.

"All mineralization and most of the fractures and faults observed seemed to fall into a strike pattern between N 55° W and N 75° W. Dips were all nearly vertical or only slightly to the southwest.

"Mineralization in the upper outcrop occurs mostly as copper sulfides and copper-iron sulfides. Chalcocite, Covellite, and Bornite were recognized. A few traces of Azurite and Malachite were observed indicating some oxidation of the original deposition. The mineralization occurs in thin veins or seams and is accompanied by mostly Calcite with some Quartz and clay, probably Kaolin. The wall rock has the appearance of a vitrified calcareous shale.

"Mineralization in the lower outcrop where a 30 foot shaft has been dug, is the same except that the ore is considerably more siliceous and contains a higher percentage of calcite. The wall rock on the north is part of the conglomerate member of the Claron limestone and the wall on the south is a rhyolite. The vein forms in a fault of unknown displacement. Alteration is apparent for about 100 feet along the strike in outcrops showing much bleaching and brown iron staining.

"Evidence of alteration, the presence of siliceous vein material, and the type of minerals found indicate that mineralization was hydrothermal. Because the evidence is not strong in abundance, it would appear that the observed mineralization is more remote from its source and that it might increase at depth.

"Mineralization on the property is not strong enough to indicate a mining operation but it is extensive enough in my opinion to warrant further exploration. There are two possibilities; one, that the grade will increase with depth where the mineral is nearer its source, and two, that ore-grade material may be found where the vein has penetrated the limestones to form replacement deposits. Because of the fact that the property can be considered no more than a prospect without further information, it is recommended that a progressive program of exploration be initiated to gain more information."

An assay certificate dated March 16, 1955, gives assays of two samples:--

Sample No.	Copper %	Oz. Ag.
1	31.31	--
2	25.04	3.5

No details are given.

An examination probably would yield little information not given in the report of the consulting geologist.

Referral to the Field Team for an opinion is recommended.

N. E. Nelson

N. E. Nelson

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
MAR - 5 1956

March 2, 1956

Re: DMEA 4195
W. Leo Knell
Highland Group
Iron County, Utah
$5,800.00 - Copper

Memorandum

To: W. R. Griswold, Defense Minerals Exploration Administration

From: N. E. Nelson, U. S. Geological Survey

Subject: Review of application.

The applicant requests assistance in exploring by core drilling two vertical veins, one in limestone the other in the contact of limestone and rhyolite, from which specimens of high-grade copper ore have been taken.

The work proposed consists of:--

Drilling 700-800 feet at $5.00/ft.	$4,000.00
Bulldozing access roads and drill sites	300.00
Supervision and consultants	600.00
Water for drilling	500.00
Contingencies	400.00
Total	$5,800.00

A geologic report lends no support to the application.

"All mineralization and most of the fractures and faults observed seemed to fall into a strike pattern between N 55° W and N 75° W. Dips were all nearly vertical or only slightly to the southwest.

"Mineralization in the upper outcrop occurs mostly as copper sulfides and copper-iron sulfides. Chalcocite, Covellite, and Bornite were recognized. A few traces of Azurite and Malachite were observed indicating some oxidation of the original deposition. The mineralization occurs in thin veins or seams and is accompanied by mostly Calcite with some Quartz and clay, probably Kaolin. The wall rock has the appearance of a vitrified calcareous shale.

"Mineralization in the lower outcrop where a 30 feet shaft has been dug, is the same except that the ore is considerably more siliceous and contains a higher percentage of calcite. The wall rock on the north is part of the conglomerate member of the Clarem limestone and the wall on the south is a rhyolite. The vein forms in a fault of unknown displacement. Alteration is apparent for about 100 feet along the strike in outcrops showing much bleaching and brown iron staining.

"Evidence of alteration, the presence of siliceous vein material, and the type of minerals found indicate that mineralization was hydrothermal. Because the evidence is not strong in abundance, it would appear that the observed mineralization is more remote from its source and that it might increase at depth.

"Mineralization on the property is not strong enough to indicate a mining operation but it is extensive enough in my opinion to warrant further exploration. There are two possibilities; one, that the grade will increase with depth where the mineral is nearer its source, and two, that ore-grade material may be found where the vein has penetrated the limestones to form replacement deposits. Because of the fact that the property can be considered no more than a prospect without further information, it is recommended that a progressive program of exploration be initiated to gain more information."

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No details are given.

An examination probably would yield little information not given in the report of the consulting geologist.

Referral to the Field Team for an opinion is recommended.

W. E. Nelson

N. E. Nelson

NENelson:iml
G-3/2/56
cc: Director's reading, 4212
Branch reading, 4212
DMMA (3)
Docket file
H. M. Meyer, 3623

Subject: DMEA-4195
Re Highland #1 and #2

W. Leo Knell
270 N. 1st E
Cedar City, Utah

February 28, 1956

Dear Sir:

The receipt of your application dated February 15, 1956 for exploration assistance under the Defense Production Act of 1950, as amended, is hereby acknowledged.

Your application has been assigned Docket Number DMEA-4195 and referred to the Base Metals Division.

Kindly identify all future correspondence relating to your application by this docket number.

Sincerely yours,

Robert E. Adams, Chief
Operations Control and
Statistics Division

February 28, 1956

III

III

-4195 W. Leo Knell

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
FEB 27 1956

February 24, 1956

224 New Customhouse
Denver 2, Colorado

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region III

Subject: Application for DMEA Aid (Copper), W. Leo Knell, Highland Claims, Iron County, Utah

Enclosed are three copies of the subject application. Only one copy of a lease and one copy of a geological report were included with the four copies of the application, and they are attached to your three copies of the application.

One copy of the application is being retained in our file.

W. M. Traver

W. M. Traver

Enclosures

MF-103
(Revised April 1952)

DMEA
Date Rec'd.
FEB 23 1956

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1085.2.

RECEIVED
FEB 27 1956
BUREAU OF MINES
Denver, Colorado

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. 4195
Metal or Mineral Copper
Date Received 2-27-56
Estimated Cost 5,800.
Participation (Government %) 50

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: W. Leo Knell
270 N. 1st E.
Cedar City, Utah

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized.

(*c*) If a corporation, add to above statement, titles, names and addresses of officers.

(*d*) If a partnership, add to the above statement the names and addresses of all partners.

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract. Claims to be explored are located in the North half of Sec. 29, Twp. 36 So., R. 15 W., S.L. B.&M., in Utah.

(*b*) State any mine name by which the property is known. Highland, Highland #1 and #2.

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise Lessee

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property. Enclosed

(*e*) If you own the land, describe any liens or encumbrances on it

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice. Bk. N. Page 473 & 474

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes. Easily accessible - ½ mi. off road

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. none

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you. I enclude a geologist's report which gives all necessary information

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points. off Highway about ½ mi. - 23 mi. to Modena - Railhead - on oiled road all the way.

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power. Plenty of hand in the area.

16—66551-1

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore Copper

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as contacts, veins, ore-bearing beds, etc. Included in geologist's report which is submitted herewith.

(*c*) The work will start within 30 days and be completed within two months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations. Have worked on Drill Rigs

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.).

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants.

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel.

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be.

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project.

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project.

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes.

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above.

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)? Yes

(*b*) How do you propose to furnish your share of the costs? ~~Yes~~

☑ Money ☑ Use of equipment owned by you ☑ Other

Explain in detail on acompanying paper. Enclosed

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated February 15, 1956

W. Les Knell
(Applicant)

By

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

Estimated Costs of Proposed Exploration of Highland, Highland #1 and #2 Claims for Copper.

(6-a) 700 to 800 ft. of Core-Drilling @ $5.00 — — 4,000.00
To be contracted to anyone who is available in the core-drilling business - and who is capable and reliable for such work.

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FEB 27 1956

Also - 30 hours of Bull-dozer work @ $10.00 per hr. --- 300.00

(-b) Geological Consultant — — — — 200.00
Supervising personal other than core drillers therefore to be furnished by W. Leo Kovell — — --- 400.00

(-c) Furnishing necessary water for Core-Drilling --- 500.00

(-d) Use of truck - tractor etc. for hauling water or any other use connected therewith, included in item C - - - -

(-e) none

(-f) none

(-g) none

(-H) An est. 10% for unforeseen Contingency -- 400.00

Total Est. Cost. $5,800.00

(7-a) Yes

(-b) We will be able to furnish 50% of the Cost, in the building of roads + drill stations, in supervisory personal, equipment and cash. The prospects are good. We would appreciate getting started on this as soon as is possible. If you need any other information please let me know. Thank you.

Sincerely yours -

W. Leo Kovell

TELEPHONE 3-3302

Hand Sample Serial 91555-56

ASSAY REPORT

UNION ASSAY OFFICE, Inc.

J. V. SADLER, President
A. C. SELBY, Vice-Pres. & Treas.
A. C. SELBY, JR., Secretary

Salt Lake City 10, Utah

Mine Leo Knell

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RESULTS PER TON OF 2000 POUNDS

March 16, 1955

NO.	GOLD Ozs. per Ton	SILVER Ozs. per ton	LEAD Per Cent Wet	COPPER Per Cent	INSOL. Per Cent	ZINC Per Cent	SULPHUR Per Cent	IRON Per Cent	LIME Per Cent	Per Cent	Per Cent	VALUE GOLD
1				31.31								
2	0.010	3.5		25.04								

Remarks Highland Claims

Charges $ 3.50 Paid

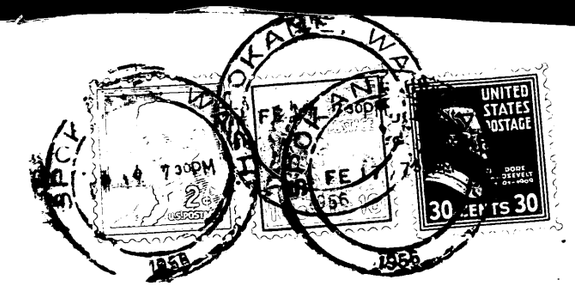
J. V. Sadler

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS
EXPLORATION ADMINISTRATION

[redacted]

OFFICIAL BUSINESS

U. S. GEOLOGICAL SURVEY
SOUTH 157 HOWARD ST.
SPOKANE 4, WASHINGTON



Mr. George C. Selfridge
Chairman, Operating Committee
Defense Minerals Explor. Admin.
Department of the Interior
Washington 25, D. C.

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FEB 2 1956

MINING LEASE

THIS AGREEMENT, entered into as of the 2nd of January, A.D. 1956, by and between Heber M. Holt and Erma E. Holt, his wife, hereinafter called "LESSORS" and W. Leo Knell, hereinafter called "LESSEE",

W I T N E S S E T H

In consideration of the sum of Six Hundred Dollars ($600.00) paid by Lessee to Lessors, receipt of which is hereby acknowledged, and of the royalty hereinafter reserved and the covenants and agreements hereinafter expressed to be faithfully kept and performed, the parties hereto mutually and severally covenant and agree as follows:

I

RIGHTS GRANTED TO LESSEE

Lessors do hereby demise, let and grant to Lessee the exclusive right and privilege to mine and dispose of all minerals in, upon or under the following described unpatented lode mining claims situated in Unorganized Mining District, Iron County, Utah, to-wit:

Name of Claim	Notice of Location Certificate Recorded in the Iron County Records at Book	Page
Highland	N	473
Highland No. 1	N	474
Highland No. 2	N	474

together with the right to construct all such works, buildings, plants, structures and appliances as may be necessary or convenient for the mining, preparation and marketing of minerals from the leased premises and to the right to use so much of the surface of the leased premises as reasonably may be required for the exercise of the rights and privileges herein granted.

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FEB 27 1956

II

PROPER OPERATION REQUIRED

Lessee shall conduct all operations on the leased premises in the manner necessary to good, minerlike and economical mining.

III

ACTUAL ROYALTIES

Lessee shall pay on all leased-deposits ores extracted and shipped or sold from the leased premises a royalty (in this instrument sometimes referred to as "actual royalty") of Ten per cent (10%) of the gross returns (to be computed as hereinafter set out) from the sale of all leased-deposits minerals or ores extracted hereunder from the leased premises PROVIDED EXPRESSLY that, where such minerals or ores are sold other than f.o.b. mine, there shall be deducted from the gross purchase price paid by the mill or other purchaser for such minerals or ores the costs of transportation thereof from mine to point of sale to the extent that such transportation costs shall not be paid by purchaser or that such transportation costs shall not be covered by an allowance or other reimbursement not included in the computation as a part of the gross purchase price. No exploratory or development allowance which shall be paid to Lessee by any governmental agency as to the leased deposits shall be deemed to constitute a portion of the gross purchase price for the purpose of determining royalties payable hereunder but any premium or bonus payments paid to Lessee in connection with the production and sale of minerals or ores produced hereunder and based upon the quantity and/or quality of the minerals and ores so produced, shall be deemed to be part of the gross purchase price and shall be included as part of the gross purchase price in the computation of royalties to the extent that payment of royalties on such bonus or premium payments is not contrary to law or government regulation.

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FEB 2 7 1953

IV

LESSOR'S RIGHT OF INSPECTION

Lessee shall allow Lessor and the agents of Lessor, from time to time, to enter upon and into Lessee's workings on said leased premises for purposes of inspection at such reasonable times as shall not interfere with the regular operation of the leased premises. It is understood and agreed that Lessee shall assume no responsibility for the safety of Lessor or the agents of Lessor when and while upon the leased premises for such purposes.

V

BOOKS AND RECORDS

Lessor and the authorized agents of Lessor shall at any and all reasonable times be permitted to inspect all books and records, including core drills assay reports, of Lessee relating to the leased premises in order to ascertain ~~and~~ the correct amount of royalty due Lessor or to determine whether or not the provisions of the Lease are being complied with.

VI

ANNUAL ASSESSMENT LABOR

Lessee agrees to perform the annual assessment labor which may be required under the Mining Laws of the United States as to the unpatented mining claims covered by this Lease.

VII

TERM OF LEASE

This Lease shall be and remain in force and effect for a term of ONE (1) year from and after the date hereof.

VIII

LESSEE'S RIGHT OF SURRENDER

It is mutually understood and agreed that Lessee may at

any time surrender and terminate this Lease as to all or any portion of the leased premises upon giving to Lessors ten (10) days' notice in writing and paying to Lessors all royalties and other sums due and payable to Lessors to the effective date of such surrender. Complete surrender of this Lease shall relieve Lessee of any obligation under Paragraph VI hereof, with respect to assessment work requirements.

IX

REMOVAL OF EQUIPMENT

It is mutually understood and agreed that upon surrender or termination of this Lease, all underground timbering supports, shaft linings and other fixtures necessary for the preservation of any mines, and all rails or head frames upon or in the said leased premises shall be and remain a part of the realty and shall revert to the Lessors without further consideration or compensation. All personal property used on the leased premises shall be and remain the property of Lessee.

It is further understood and agreed that all personal property of Lessee located within or upon the leased premises, and all buildings, machinery, equipment and tools (other than the fixtures to become the property of Lessor as above provided), shall, in case of surrender or termination of this Lease, be removed by Lessee from the leased premises within a reasonable time after such surrender or termination.

X

MANNER OF GIVING NOTICE

Any notice contemplated herein to be served upon Lessee shall be in writing and shall be sufficiently given if deposited in the United States mail, postage prepaid and registered and addressed as follows:

W. Leo Knell
Box 5 - Newcastle, Utah

or in such other manner and at such other address as Lessee may from time to time in writing designate by written notice to Lessors.

Any notice contemplated herein to be served upon Lessors shall be in writing and shall be sufficiently given if deposited in the United States mail, postage prepaid and registered and addressed as follows:

Mr. & Mrs. Heber M. Holt
Enterprise, Utah

or in such other manner and at such other address as Lessors may from time to time in writing designate.

Service of notice by mail shall be deemed effective and complete upon the date of posting and mailing in accordance herewith. Personal service of notice upon the designated addressee shall be deemed sufficient service of notice and no mailing of notice shall be necessary in the case of such personal service.

XI

ASSIGNMENT

The provisions hereof shall inure to the benefit of and shall be binding upon the successors in interest, legal representatives and assigns of the respective parties hereto, but no party hereto shall be chargeable with notice of any assignment or conveyance until such party shall have been furnished with written notice thereof and with a duplicate, certified or photostat copy of the instrument of assignment or conveyance.

XII

OPTION TO EXTEND TERM OF LEASE

The option is hereby given to Lessee to extend the term of this lease for a period of One year upon giving Lessors notice of his intention to do so. Such notice shall be given at least thirty days prior to January 2, 1957. In event Lessee exercises the option granted by this paragraph, he shall, during such extended term, pay Lessors the same royalty provided by paragraph III hereof.

XIII

OPTION TO PURCHASE

The option is hereby given to Lessee to purchase the leased premises for a consideration of $100,000.00 at any time during the term of this lease or any extension or extensions thereof. Such option shall be exercised by giving Lessors written notice thereof as herein provided. In event of exercise of this option by Lessee, any and all rental and royalty payments made under this lease, or any extension or extensions thereof, shall be credited toward the total purchase price.

IN WITNESS WHEREOF these presents are executed as of the day and year first above written.

Heber M. Holt
Heber M. Holt

Erma E. Holt
Erma E. Holt

LESSORS

W. Leo Knell
W. Leo Knell

LESSEE

STATE OF UTAH)
: ss.
COUNTY OF)

On the day of , A.D. 1956, personally appeared before me Heber M. Holt, one of the signers of the above instrument, who duly acknowledged to me that he executed the same.

Walter W Bowler
Notary Public
Residing at Enterprise Utah

My commission expires:
May 15-1956

STATE OF UTAH)
: ss.
COUNTY OF)

On the day of , A.D. 1956, personally appeared before me Erma E. Holt, one of the signers of the above instrument, who duly acknowledged to me that she executed the same.

Walter W Bowler
Notary Public
Residing at Enterprise Utah

My commission expires:
May 15-1956

STATE OF UTAH)
: ss.
COUNTY OF)

On the day of , A.D. 1956, personally appeared before me W. Leo Knell, one of the signers of the above instrument, who duly acknowledged to me that he executed the same.

Walter W Bowler
Notary Public
Residing at Enterprise Utah

My commission expires:
May 15-1956

RECEIVED
FEB 27 1956

GEOLOGICAL REPORT

HIGHLAND CLAIMS GROUP

NEWCASTLE, IRON COUNTY, UTAH

LOCATION:

The Highland claims group is located 2 miles south of Newcastle, Utah, on a graded dirt road connecting the towns of Newcastle and Enterprise. The group lies in Section 29, Township 36 South, Range 15 West.

ACCESSIBILITY:

The claims may be reached by driving from Cedar City, Utah, 30 miles west on Utah State Road #56 to the town of Newcastle. At Newcastle a turn is made to the south on Utah State Road #16 which is followed for 1.4 miles where a turn is made to the east and a graded dirt road is followed for 0.6 miles. This point is nearly adjacent to the northwest corner of the first Highland claim.

TOPOGRAPHY:

The terrain consists of fairly steep rugged mountains, at the northern end of the Pinto Range, rising rapidly out of the flat Escalante Valley and desert to the west.

GEOLOGY:

The geology of the area is a complex study of tilted and faulted sediments and igneous lavas and porphyrys.

The sedimentary units make up the Claron limestone of Tertiary age. They consist of gray and brown limestones and conglomerates made up of pebbles of limestone, quartzite, chert and other siliceous rocks. The beds dip about 30° to the southwest and strike generally S 75° E. Numerous faults striking generally northwest break the beds and displacements vary up to 75 feet.

After deposition of Tertiary sediments, biotite andesite laccoliths were intruded into the sediments and later up to 2000 feet of bedded lavas were extruded. These consisted of rhyolitic, trachytic, and andesitic flows and porphyrys.

EXPLORATION:

The initial project in the program would be the drilling of four diamond drill holes, two on each outcrop. Aggregate footage would amount to about 700 feet. The purpose of these drill holes would be to determine the amount and grade of mineralization and its character at a depth of over 100 feet.

The four drill holes should be spotted as shown on the map, two each, southwest of the strike of the veins. The holes should be placed 100 feet apart on a line parallel with the strike of the vein and 100 feet down the slope from it. The holes should be directed to hit the strike of the vein as nearly perpendicular as possible and should be drilled at an angle of 45° from horizontal.

A study of the results of this drilling should be made with the view of determining the amount and type, if any, of further exploration. Only a small amount of exploration is planned initially because it is felt that this work will be sufficient to prove or disprove the worth of additional exploration.

From 20 to 40 hours of bulldozer work is estimated to be needed to build access roads and drill sites. The easiest route for a road would be up the dry wash, shown on the map, then curving back under the lower outcrop and around and up the hill to the upper outcrop.

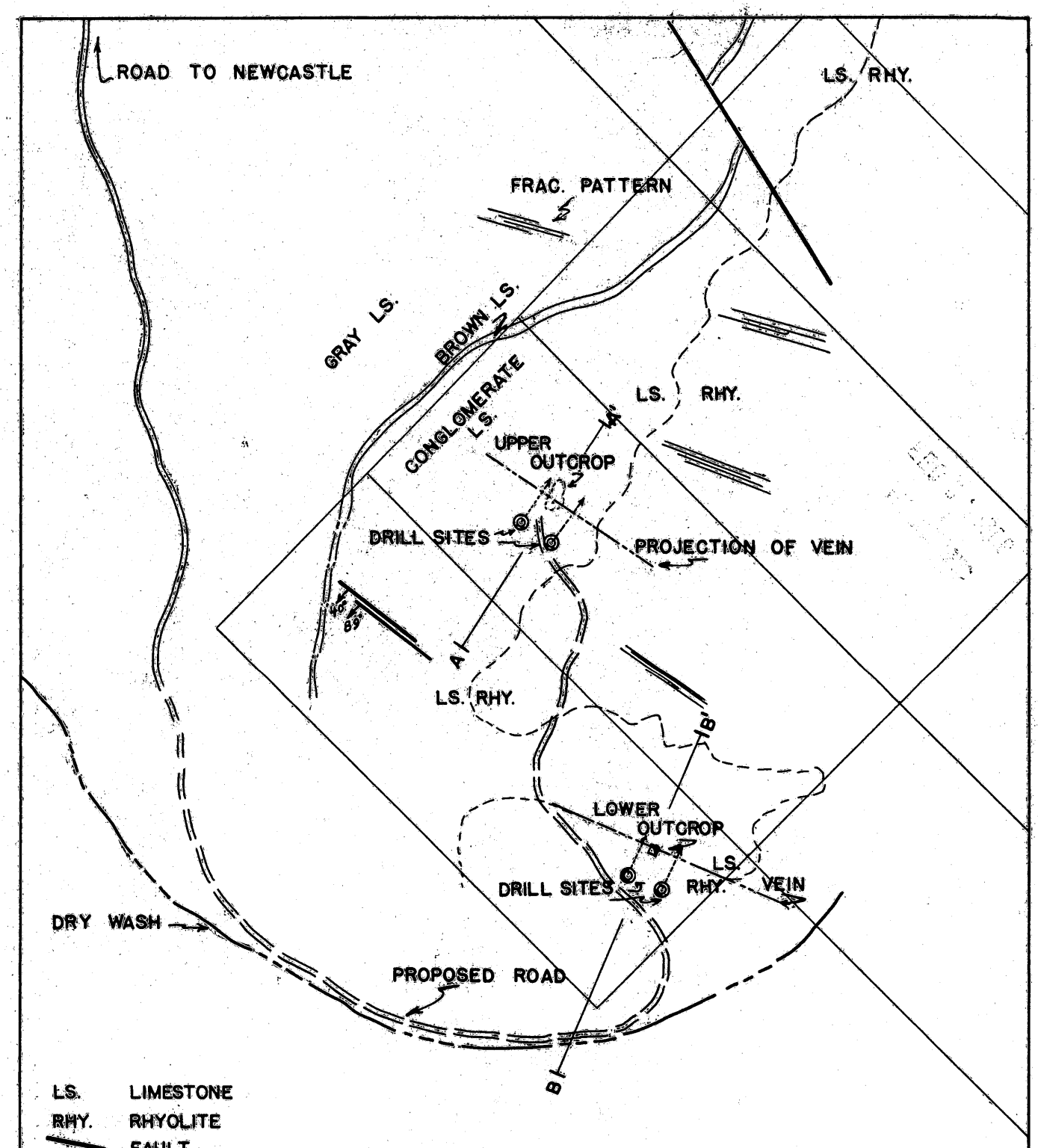
The accompanying map and sections show the general geology and approximate claim boundaries, the proposed road route, and the approximate position and length of the drill holes in relation to the mineralized outcrops.

Edwin J. Poehlmann

Edwin J. Poehlmann
Geological Engineer

EJP/rm

November 26, 1955



LS. LIMESTONE
RHY. RHYOLITE
FAULT
MINERALIZED VEIN
FRACTURE PATTERNS
DRILL HOLE

GEOLOGICAL MAP SHOWING
PROPOSED DRILL SITES

HIGHLAND CLAIMS

NEWCASTLE, UTAH

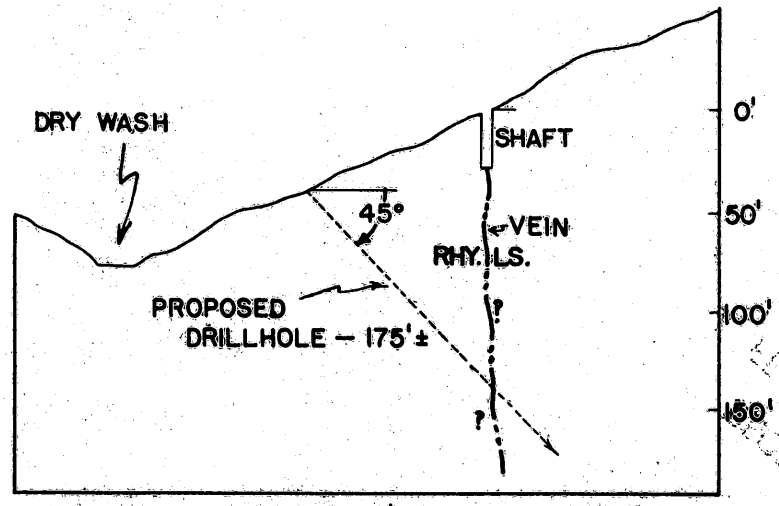
SCALE 1" = 400'

GEOLOGICAL MAP SHOWING
PROPOSED DRILL SITES

HIGHLAND CLAIMS

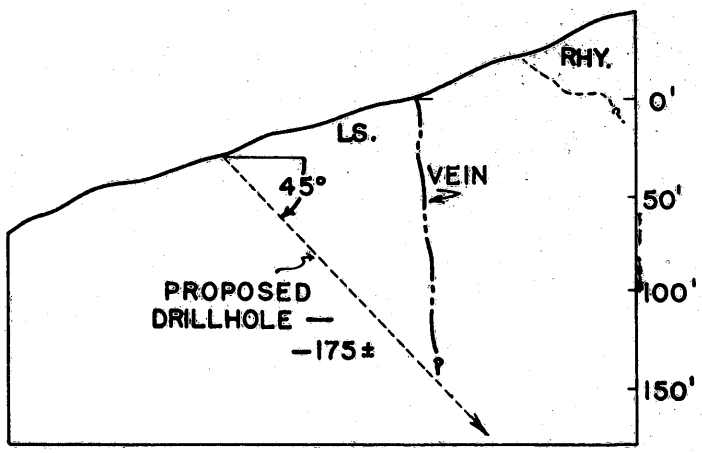
NEWCASTLE, UTAH

SCALE 1" = 400'



VERTICAL SECTION B—B'
LOOKING NORTHWEST

LOWER OUTCROP
SCALE 1" = 100'



VERTICAL SECTION A—A'
LOOKING NORTHWEST

UPPER OUTCROP
SCALE 1"= 100'

VERTICAL SECTIONS

HIGHLAND CLAIMS

NEWCASTLE, UTAH

VERTICAL SECTION B—B'
LOOKING NORTHWEST

LOWER OUTCROP
SCALE 1" = 100'

VERTICAL SECTION A—A'
LOOKING NORTHWEST

UPPER OUTCROP
SCALE 1" = 100'

VERTICAL SECTIONS

HIGHLAND CLAIMS

NEWCASTLE, UTAH

RECEIVED
FEB 27 1956

At the Highland claims rhyolitic flows cover higher elevations with apparently little pattern. These rocks vary from light gray to dark brown in color and from felsitic to porphyritic in texture. Phenocrysts in the porphyrys are feldspars, quartz, and some biotite mica. Textures and colors vary greatly within distances in the order of 75 to 100 feet.

All mineralization and most of the fractures and faults observed seemed to fall into a strike pattern between N 55° W and N 75°W. Dips were all nearly vertical or only slightly to the southwest.

Mineralization in the upper outcrop occurs mostly as copper sulfides and copper-iron sulfides. Chalcocite, Covellite, and Bornite were recognized. A few traces of Azurite and Malachite were observed indicating some oxidation of the original deposition. The mineralization occurs in thin veins or seams and is accompanied by mostly Calcite with some Quartz and clay, probably Kaolin. The wall rock has the appearance of a vitrified calcareous shale. Copy

Mineralization in the lower outcrop where a 30 foot shaft has been dug, is the same except that the ore is considerably more siliceous and contains a higher percentage of calcite. The wall rock on the north is part of the conglomerate member of the Claron limestone and the wall on the south is a rhyolite. The vein forms in a fault of unknown displacement. Alteration is apparent for about 100 feet along the strike in outcrops showing much bleaching and brown iron staining.

Evidence of alteration, the presence of siliceous vein material, and the type of minerals found indicate that mineralization was hydrothermal. Because the evidence is not strong in abundance, it would appear that the observed mineralization is more remote from its source and that it might increase at depth.

RECOMMENDATIONS:

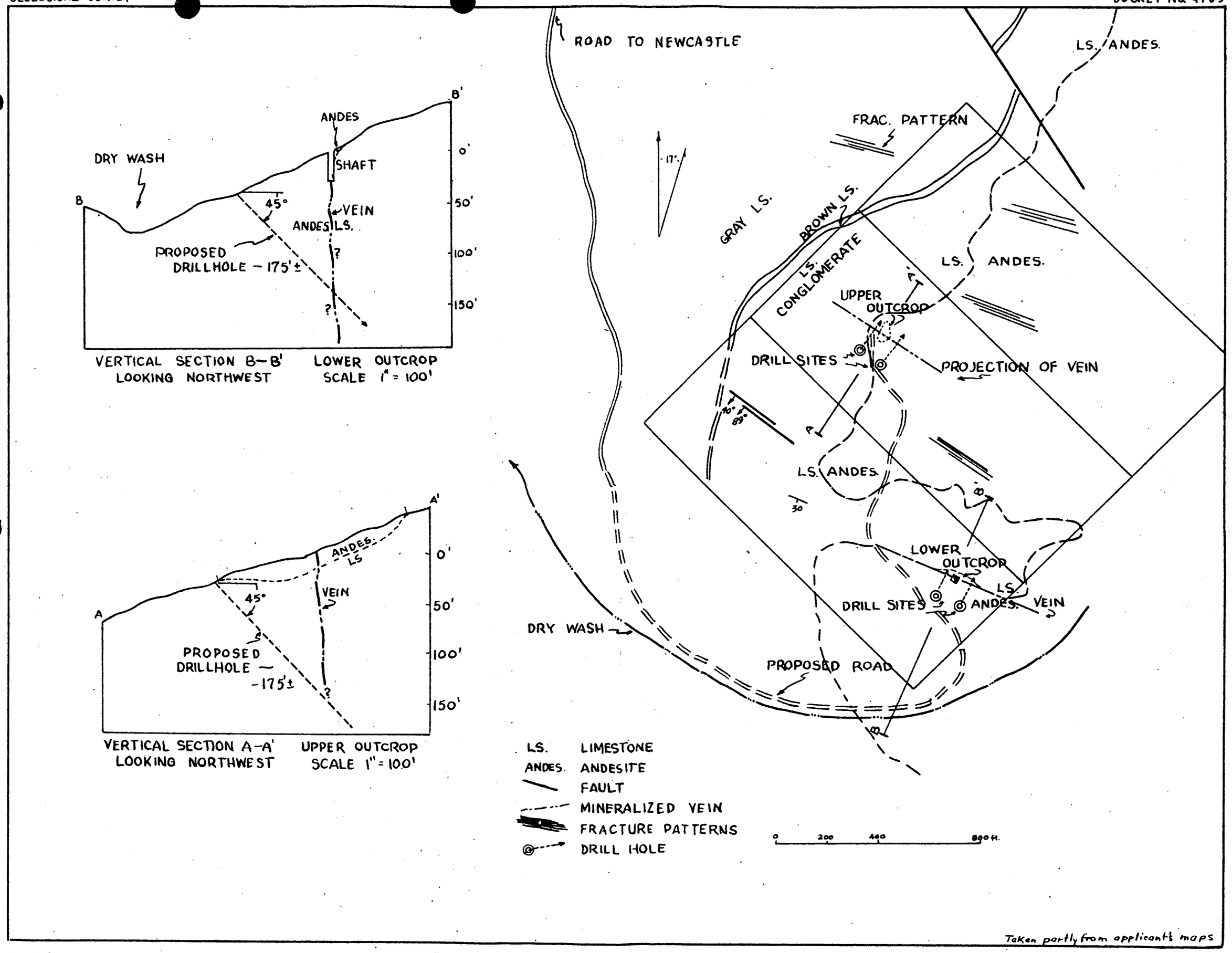
Mineralization on the property is not strong enough to indicate a mining operation but it is extensive enough in my opinion to warrant further exploration. There are two possibilities; one, that the grade will increase with depth where the mineral is nearer its source, and two, that ore-grade material may be found where the vein has penetrated the limestones to form replacement deposits. Because of the fact that the property can be considered no more than a prospect without further information, it is recommended that a progressive program of exploration be initiated to gain more information.

GEOLOGICAL REPORT

HIGHLAND CLAIMS

NEWCASTLE, UTAH NOVEMBER 26, 1955

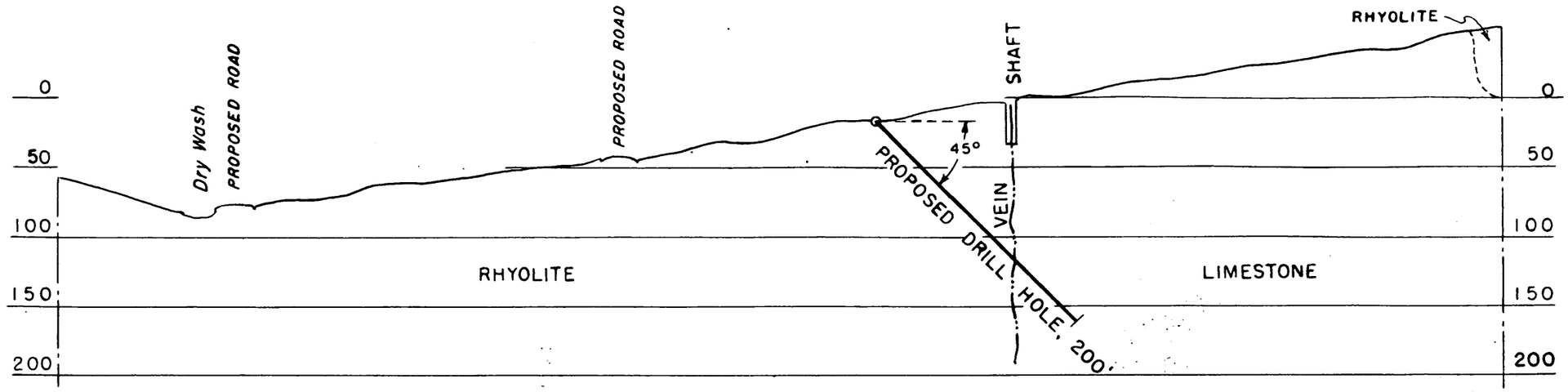
EDWIN J. POEHLMANN, G.E.



Taken partly from applicant's maps

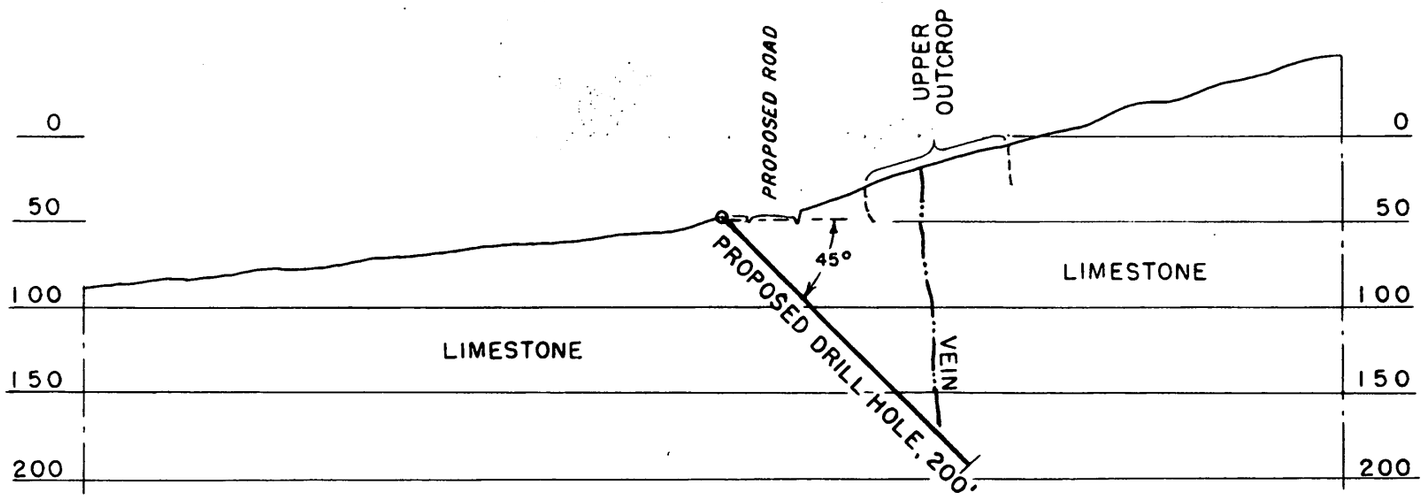
FIG. 2

GEOLOGIC SKETCH MAP & SECTIONS OF HIGHLAND CLAIMS
IRON COUNTY, UTAH



VERTICAL SECTION B-B', LOWER OUTCROP,

LOOKING NORTHWEST

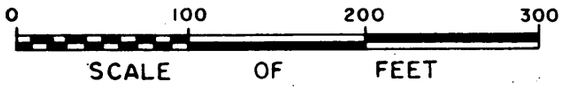


VERTICAL SECTION A-A', UPPER OUTCROP,

LOOKING NORTHWEST

NOTE

DATA TAKEN FROM COMPANY MAP.



U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

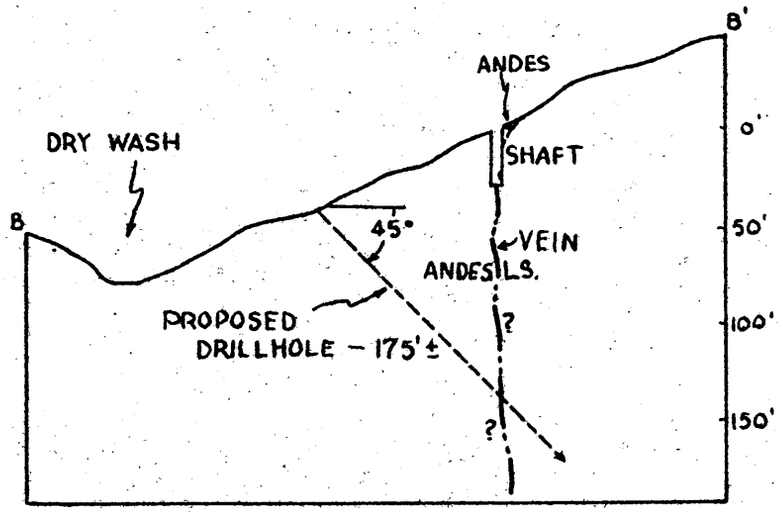
Fig. 3 DMEA Docket No. 4195

Vertical Sections thru Proposed Drill Holes

W. LEO KNELL, HIGHLAND CLAIMS

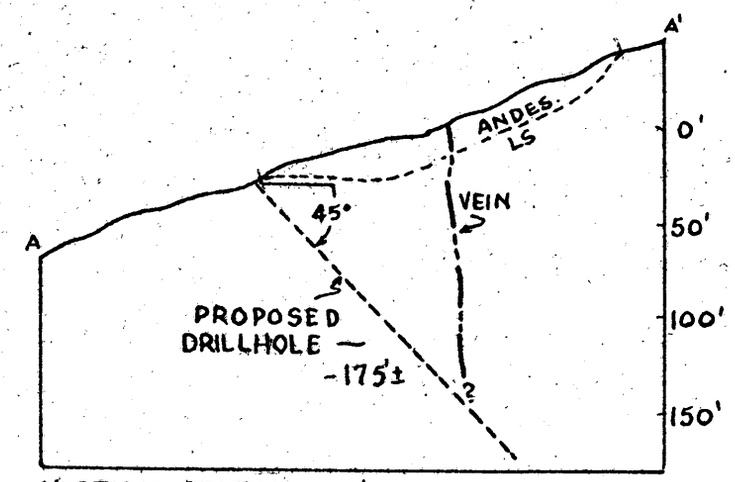
IRON COUNTY, UTAH

ENGINEER: W. E. YOUNG	DATE: MAY 7, 1956
DRAWN: MAY, 1956; A.P.T.S.	1900-141 - F
CHECKED:	



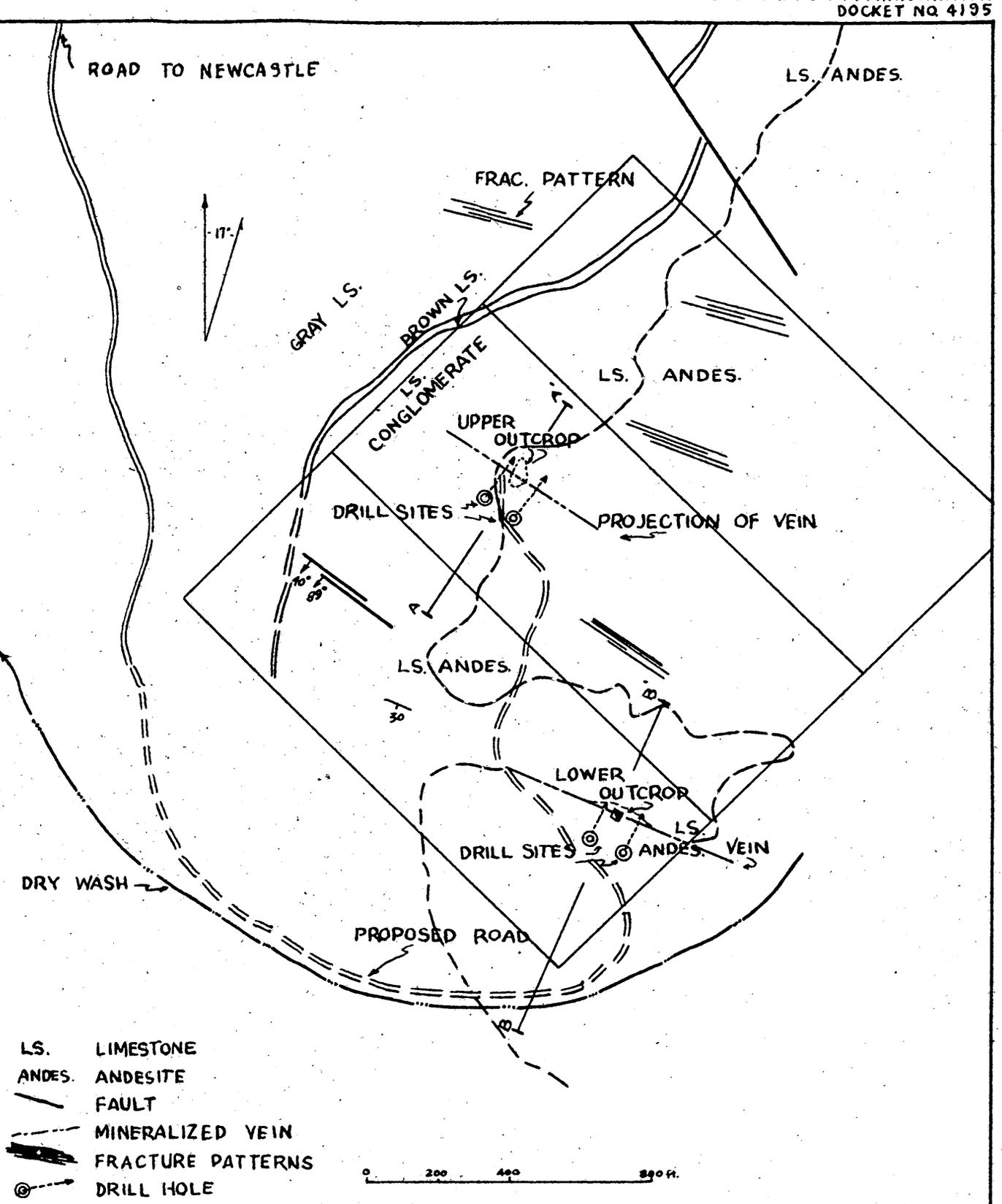
VERTICAL SECTION B–B'
LOOKING NORTHWEST

LOWER OUTCROP
SCALE 1" = 100'



VERTICAL SECTION A–A'
LOOKING NORTHWEST

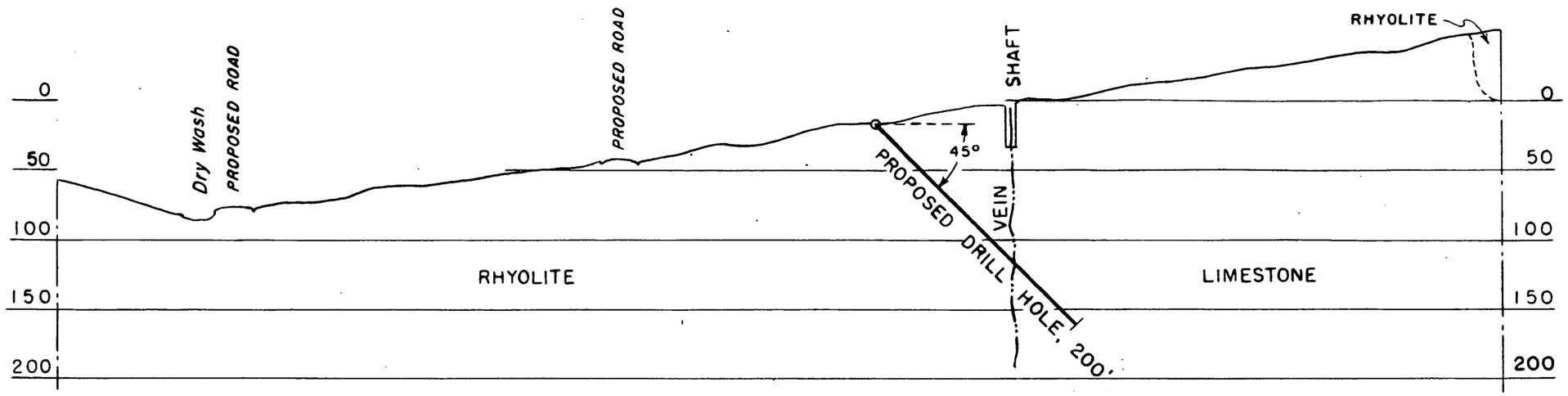
UPPER OUTCROP
SCALE 1" = 100'



Taken partly from applicant's maps

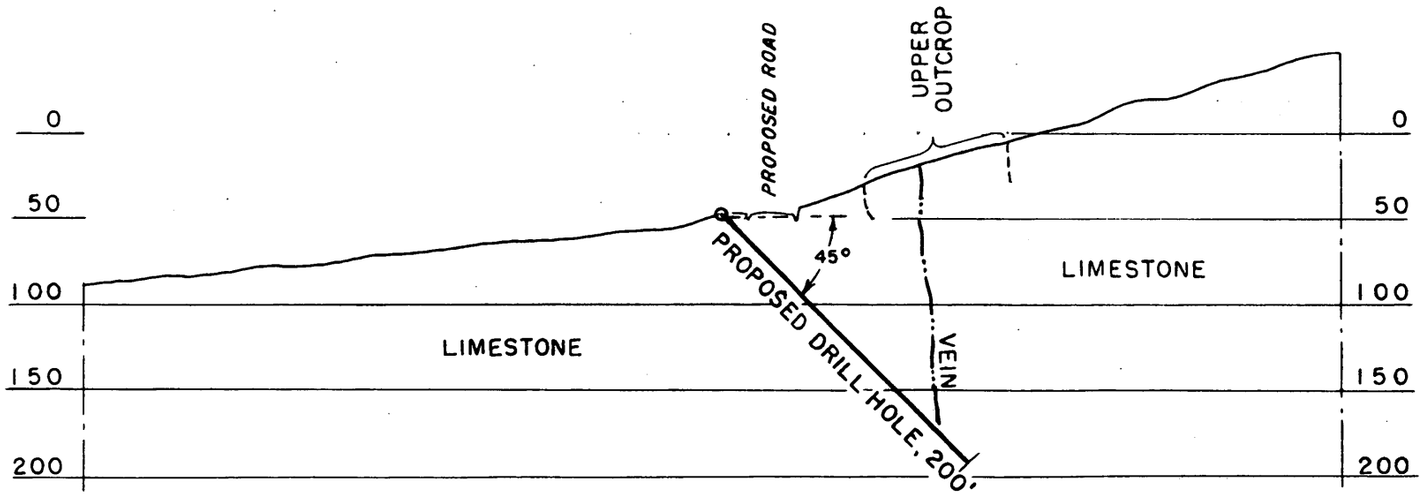
FIG. 2

GEOLOGIC SKETCH MAP & SECTIONS OF HIGHLAND CLAIMS
IRON COUNTY, UTAH



VERTICAL SECTION B-B', LOWER OUTCROP,

LOOKING NORTHWEST

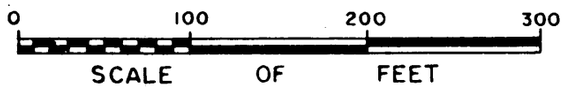


VERTICAL SECTION A-A', UPPER OUTCROP,

LOOKING NORTHWEST

NOTE

DATA TAKEN FROM COMPANY MAP.



U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

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Vertical Sections thru Proposed Drill Holes

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IRON COUNTY, UTAH

ENGINEER: *W. E. YOUNG*	DATE: MAY 7, 1956
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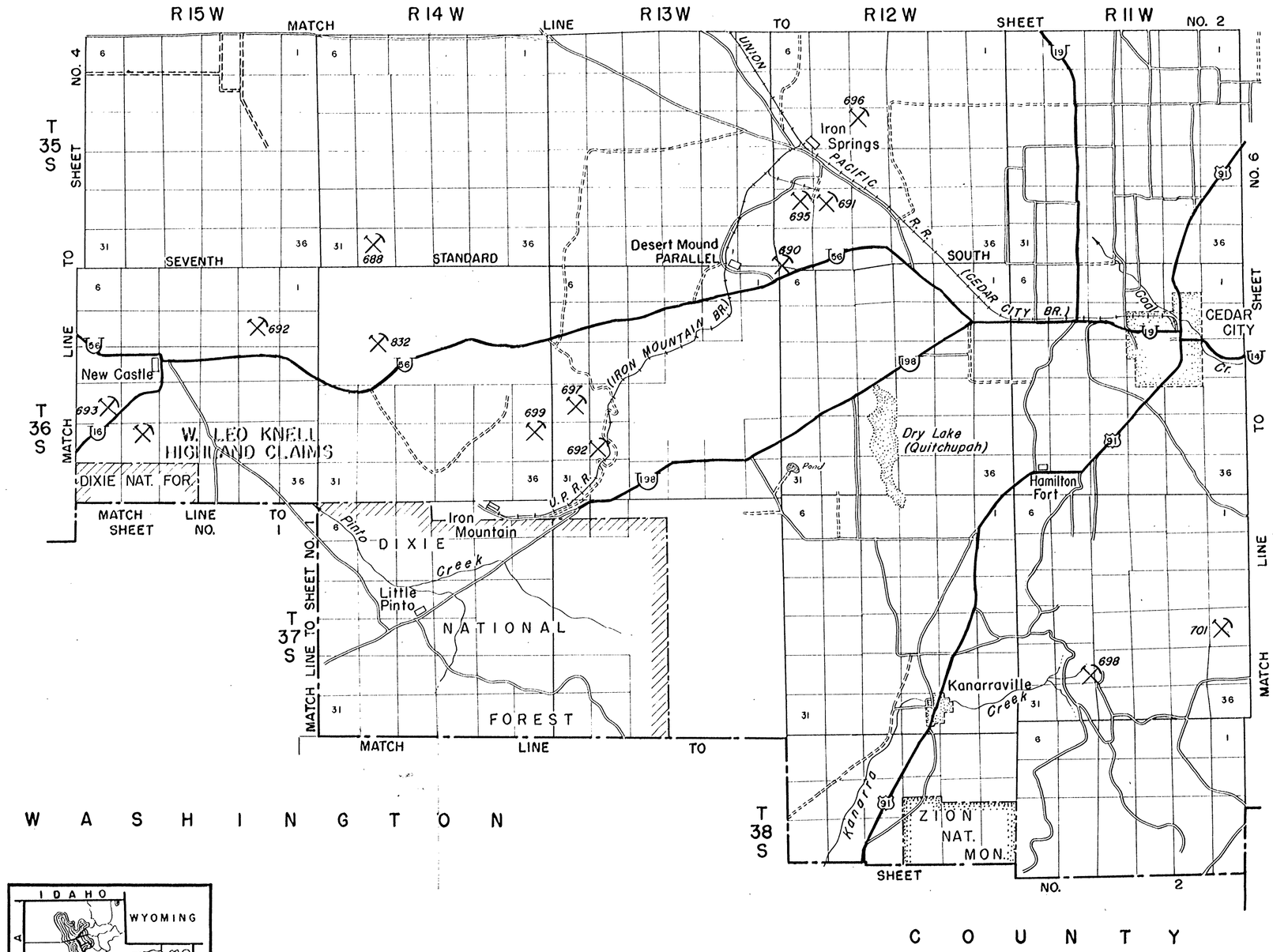
CHECKED:	



U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Fig. 1

DMEA Docket No. 4195

STATE:- UTAH

COUNTY:- IRON

Sheet 5 of 6

Location Map

ENGINEER:- W. E. YOUNG	DATE:- MAY 3, 1956
TRACED: MAY, 1956; BY:- A.P.T.S.	1400 - 139 - C
CHECKED:-	